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AUGUST 2000

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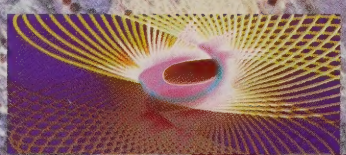
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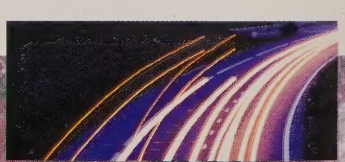
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Editor's view

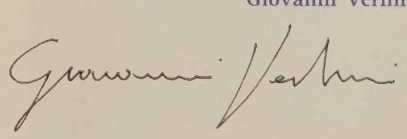
Quoting oneself is usually interpreted as a sign of presumption and arrogance, but I hope that you will not question my modesty and humbleness if I indulge in doing it for once. In the January 2000 issue of Asia-Pacific Satellite, I argued that: "The forces of globalisation, liberalisation and privatisation are forcing operators in the Asia-Pacific region to consolidate their position in the market" ['Asia-Pacific Satellite @ 2000', *Asia-Pacific Satellite* January 2000, volume six number one, pages 13-15]. Then, I went on to say that: "This trend is likely to lead to a growing number of partnerships and mergers and, in ultimate analysis, to a reduction in the number of operators in the market." News coming from the Asia-Pacific satellite scene in recent weeks seem to indicate that the operators in the Asia-Pacific region are beginning to cooperate at different levels and that the analysis formulated at the beginning of the year was ultimately correct.

The latest news item regarding one of these 'cooperation initiatives' to reach *Asia-Pacific Satellite*'s newsdesk was about a joint-venture between APT Satellite Holdings Ltd (APT Satellite) of Hong Kong Special Administrative Region (SAR) and Singapore Telecommunications Ltd (SingTel). APT Satellite Glory Ltd, a wholly-owned subsidiary of APT Satellite, and SingaSat Private Ltd, a wholly-owned subsidiary of SingTel announced that they signed a joint-venture agreement in relation to APT Satellite Telecommunication Ltd (APT Telecom). The newly-formed company was granted an external satellite-based Fixed Telecommunications Network Services (FTNS) licence in Hong Kong SAR. Under the terms of the licence, APT Telecom will be able to offer external telecommunications services in Hong Kong through APT Satellite's fleet of spacecraft and other systems. Initially, the company plans to offer three external telecommunications network services: wholesale telecommunications services, Very Small Aperture Terminal (VSAT) services, and Internet Point-Of-Presence (POP) gateway.

However, this trend towards forming joint-ventures and cooperating among former rivals is not limited just to satellite operators in the Asia-Pacific region, but is affecting global players as well, such as those operators that are planning to deliver Mobile Satellite Services to handheld handsets. In this regard, a new chapter was recently added to the Global Mobile Personal Communications by Satellite (GMPCS) saga. ICO-Teledesic, the global satellite venture backed by Craig McCaw, announced a US$1 billion cash injection from investors including McCaw's Eagle River, Clayton, Dubilier & Rice (CD&R) and Microsoft Chairman Bill Gates. US private equity group CD&R will provide $150 million, with the option to invest a further $200 million at a later date. Bill Gates, a founding investor in Teledesic, will provide $100 million through his private investment vehicle Cascade Investment. Additional investors will provide a total of $65 million. The company said it has proposed the merger of New ICO, recently saved Chapter 11 with a $1.2 billion rescue package, with Teledesic and holding company ICO-Teledesic Global.

On the whole, in the future we are likely to witness more of these deals between companies at all levels of the satellite industry [see article 'In the mood for consolidation' in this issue]. May be, after all, the new millennium is really turning into the age of cooperation, joint-ventures and mergers!

Giovanni Verlini



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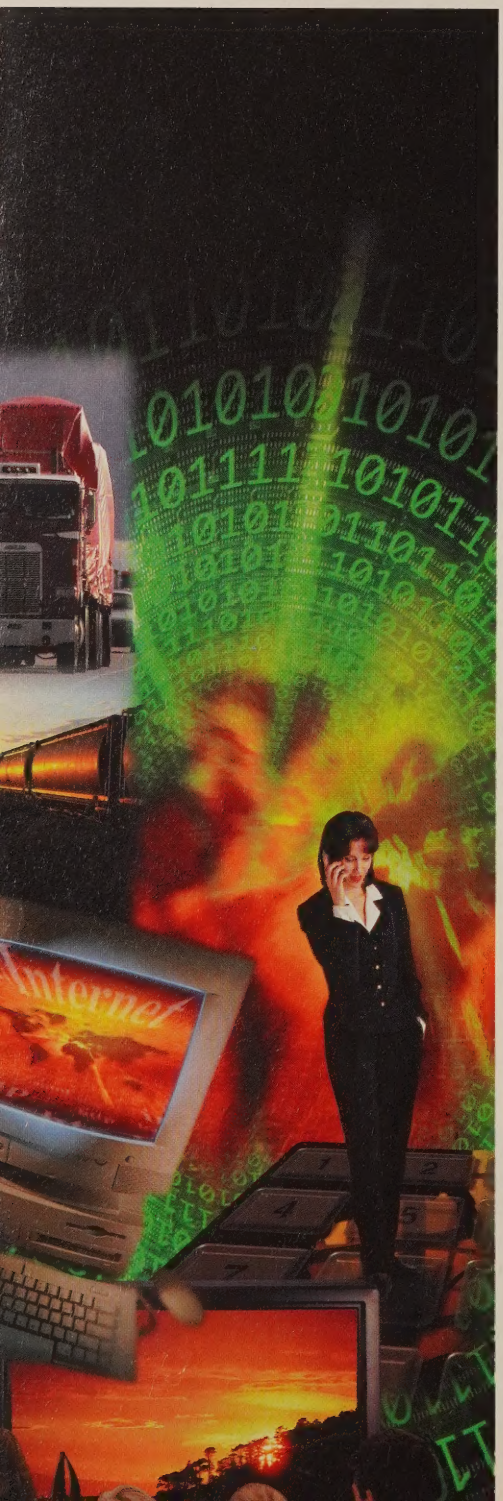

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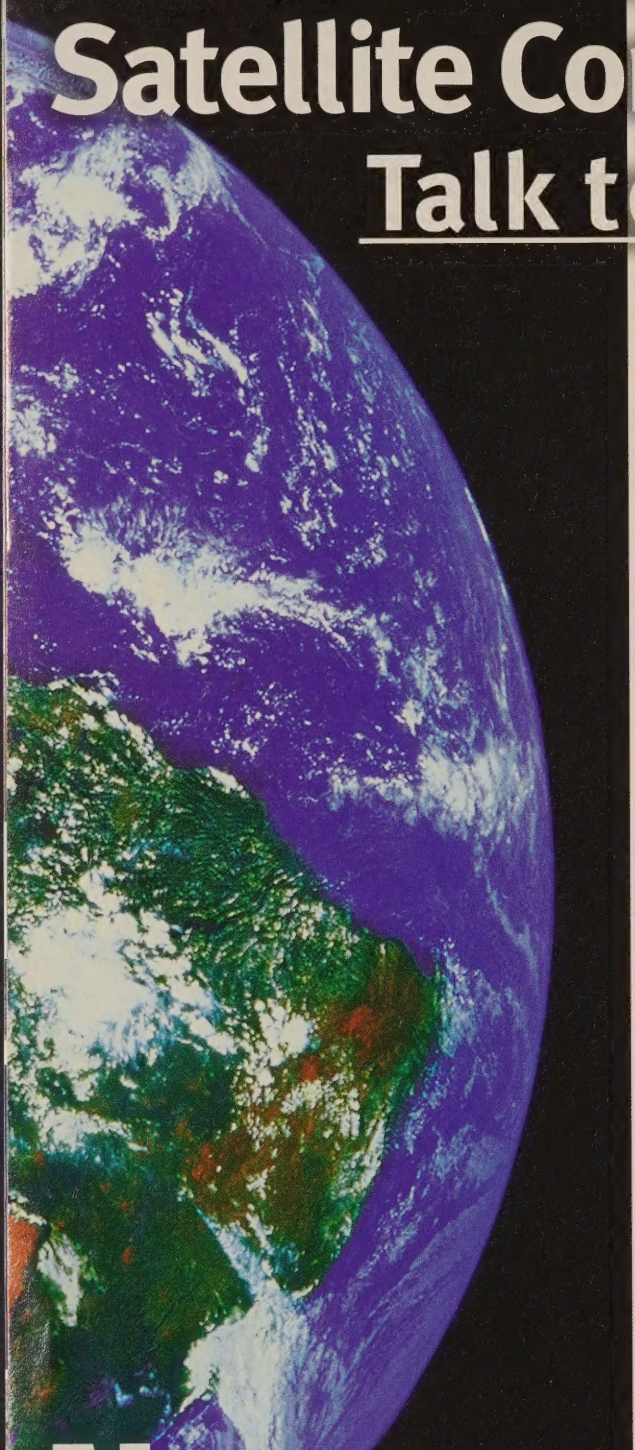

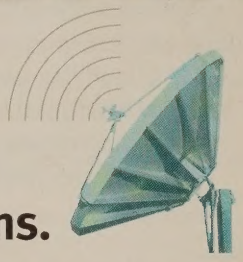

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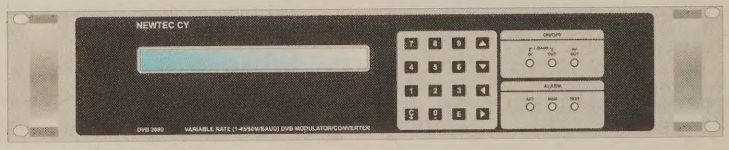

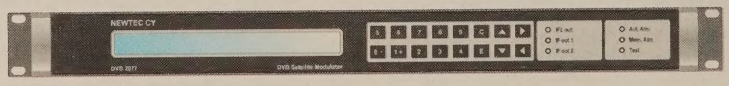

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NewsBriefs

HONG KONG

Asia Satellite Telecommunications Company Limited (AsiaSat) has been granted a licence to maintain and operate a payload of four Broadcasting Satellite Service (BSS) channels onboard AsiaSat-4.

AsiaSat-4 is expected to be launched in early 2002 and will carry four BSS channels to Hong Kong in addition to a Fixed Satellite Service (FSS) payload.

The four transponders can be used for the provision of Direct-To-Home (DTH) broadcasting services offering as many as 40 digital television channels.

KOREA

At the recent historic summit in Pyongyang, North Korea, between North and South Korea, South Korean officials used Globalstar's mobile satellite phones to make the first commercial telephone calls directly between the two countries in almost 50 years.

Equipped with 11 Globalstar Qualcomm phones, South Korean officials accompanying South Korean President Kim Dae Jung, were able to communicate with their counterparts in Seoul, South Korea, throughout the summit.

During the summit, Globalstar phones transmitted clear voice signals via the system's satellite constellation and the Globalstar gateway in Yeoju, South Korea, said a Globalstar statement.

UK/CHINA

Surrey Satellite Technology Limited (SSTL) has successfully launched two of its latest satellites, SNAP-1, a nanosatellite weighing 6.5 kilograms, and Tsinghua-1, a microsatellite built in collaboration with Tsinghua University. The two satellites were launched a day apart.

SNAP-1 will evaluate the use of commercial micro-miniature technologies, while Tsinghua-1 carries experimental communications payloads.

ACeS, LMGT and Ericsson sponsor first Chinese K2 expedition

Photo: ACeS

REGIONAL/US

Asia Cellular Satellite (ACeS), the first regional satellite-based handheld mobile telecommunications system designed exclusively for the Asia-Pacific region, has partnered with US-based telecommunications services provider Lockheed Martin Global Telecommunications (LMGT) and Ericsson to sponsor the Cross Strait Chinese Qogori Expedition.

The Qogori Mountain, also known as K2, is the world's second highest mountain and is located on the border of China and Pakistan. As part of the sponsorship, ACeS and Ericsson will supply the team with several R190 satellite phones. The Ericsson R190 is the world's smallest and lightest dual mode satellite/GSM phone and is ideal to meet the climbers' weight and size requirements. Additionally, ACeS will provide extended service to allow the climbers to provide regular updates on their progress while at high altitude areas beyond the Global System for Mobile Communication (GSM) coverage area.

The K2 expedition, comprising 15 of some of the world's most experienced climbers from Beijing, Tibet, Hong Kong and Taipei, is the first ever attempt by Chinese trekkers. The climb has been officially approved by the State Department of The People's Republic of China and is jointly organized by the Chinese Mountaineering Association and Taipei Himalayan Club. The team set out on 1 June and expects to reach the summit of K2 by late August, 2000.

Adi R Adiwoso, CEO and President Director of PSN and ACeS International Ltd, said: "The ACeS system will allow the climbers to make calls from more than 8,600 metres above sea level, enabling the world to follow the progress of this historic trek".

Daryl Chambers, Managing Director of Ericsson's satellite division, added: "While on the mountain, the K2 team members will be able to use the satellite/GSM antenna to communicate with the world in satellite mode. Once back in a GSM coverage area, they have the option of replacing the antenna with a smaller, snap-on GSM-only antenna, which will convert the Ericsson R190 into a regular cellular phone".

Globecast to offer broadband services in India

INDIA/FRANCE

Globecast, the broadband service provider and worldwide broadcasting arm of France Telecom, has announced that it will be launching a broadband service providing Internet access to the Indian subcontinent.

The move is designed to meet growing demand for Internet Protocol (IP)-based services, and is part of Globecast's plans to expand on the subcontinent, said the company.

With the advent of deregulation and convergence in India, Globecast plans to offer application and content-driven value-added services to broadcasters and other content providers seeking to reach one of the world's largest and fastest growing markets. In addition, Globecast sees satellite technology as the ideal means of delivering broadband Internet and e-commerce services to areas within India with a poor infrastructure.

The company will target Internet Service Providers (ISPs) and cable TV operators that need to transmit IP and other broadband content to their customers, as well as targeting corporations that need access to the Internet for their operations through the platform's high-speed, multicast capabilities.

The platform will be delivered from the Europe*Star-1 satellite. The satellite is due to be launched in early autumn at 45 degrees East of longitude and will be equipped with Ku-band transponders.

Globecast said that customers within the satellite's footprint will be able to receive the signal using a small receiver dish ranging from 1.2 to 1.8 metres.

Europe*Star Ltd is a joint venture between Alcatel Space and Loral.

ACeS International, PT Pasifik Satelit Nusantara and Nera ASA sign MoU for MDR

REGIONAL/NORWAY

ACeS International, PT Pasifik Satelit Nusantara (PSN) and Nera ASA, a Norwegian-based wireless telecommunications solutions company, have reported that they have signed a Memorandum of Understanding (MoU) whereby the parties intend to cooperate to develop a Medium Data Rate (MDR) service for the ACeS system. This is a mobile and fixed service that will be offered throughout Asia by ACeS in addition to the satellite operator's voice service.

The agreement plans for the development of both a gateway and lightweight portable user terminal providing 128kbit/s mobile data services via the Garuda-1 satellite.

Nera ASA intends to distribute the terminals through its existing Asian distribution network. Nera ASA said that an agreement with ACeS will strengthen its position as a leading supplier of satellite data terminals.

Nera ASA's high degree of innovation and the high performance of the ACeS satellite system enable user friendly, small and cost effective terminals. The agreement also fits nicely into Nera ASA's strategy, where an important goal is to work with several mobile satellite communication systems and, through this, contribute to the expansion of the total mobile satellite communication market and become a leader in this industry, said the company.

Adi Adiwoso, President and Chief Executive Officer (CEO) of PT Pasifik Satelit Nusantara and ACeS International Ltd, said: "We are extremely pleased to be working with Nera to develop the next generation of ACeS services and capabilities. Medium speed data rates for ACeS will further enhance the mobile telecommunications services for all ACeS subscribers throughout Asia. ACeS subscribers will have access to mobile Internet services throughout Asia."

Commercial services are expected to be launched in 2001/2002.

In separate news, PSN, the designated national service provider in Indonesia for ACeS mobile satellite services, has appointed four national distributors. PT Tirta Graha Mas and PT Tritama Anugerah Mandiri will distribute the PSN SIM cards, while PT Cipta Multi Usaha Perkasa and PT Teleartindo Nusantara will supply the cards and the Ericsson R190 handsets.

Together, the four retail distributors control more than 75 per cent of Indonesia's Global System for Mobile Communication (GSM) outlets.

Optus awards control software contract to Integral Systems

AUSTRALIA/US

US-based satellite ground systems provider Integral Systems Inc has announced that the telecommunications provider Cable & Wireless Optus (Optus) has awarded the company a contract to provide the primary and backup control software for the Optus-C1 satellite.

Optus' primary and backup satellite control centres will use Integral's EPOCH 2000 software products for the satellite, and the associated baseband equipment command and control. The EPOCH 2000 software will provide real-time spacecraft and ground system command and control, as well as offline trending functions, according to a statement by Integral Systems.

As the C1 satellite is a hybrid communications and military satellite, the Australian Department of Defence (DoD) will also use the EPOCH 2000 software from their primary and backup control centres to command and monitor the Defence Payload on board the satellite.

Stuart Daughtridge, Vice President (VP) of the Commercial Division at Integral Systems said: "EPOCH's ability to meet Optus' unique commercial and DoD requirements is further confirmation of its functionality and versatility".

Optus operates four of its own satellites as well as satellites for other operators in the Asia-Pacific region.

The Australian telco's US$300 million C1 satellite is due for launch in early 2002 and will have a 15-year life span. Approximately half the satellite's capacity will be taken by the commercial payload delivering next generation Direct-To-Home (DTH) TV and Internet, telephony and high-bandwidth data communications throughout Australia and the Asia-Pacific region.

Mitsubishi Electric Corporation is the prime contractor and will develop the communications payload, while Space Systems/Loral (SS/L) will build and test the satellite bus, integrate the payload with the satellite bus and test the integrated satellite before launch.

NewsBriefs

BANGLADESH

Bangladeshi Ekushey TV (ETV) has signed a new lease for C-band capacity on AsiaSat-3S to broadcast a new Bangladeshi-language television channel. The new channel broadcasts up to 12 hours of programming, including sports, news, education and entertainment programmes.

ETV, the first private television network in the country, aims to reach 90 per cent of the population.

REGIONAL/EUROPE

In a deal aimed at bridging Asian and European telecoms industries, the financing of the Eurasiasat-1 broadcast satellite has been concluded, paving the way for its manufacture and launch this year.

Eurasiasat-1 will provide TV, telephony and video data services in Turkey, Europe and Asia. The satellite will be operated by Monaco-based Eurasiasat.

THAILAND/NORWAY

Shin Satellite has signed an agreement with Norwegian equipment supplier Nera ASA. The deal, valued at US$4.9 million, will see Nera provide core gateway technology for the iPSTAR system.

The iPSTAR system will see first generation technology rolled out in 2000 and 2001. The second generation will support the further expansion of the terrestrial infrastructure as satellite coverage is extended further over Asia and Australia. Shin Satellite says that the system has the potential to be expanded globally by deploying additional satellites.

iPSTAR is expected to provide low-cost broadband services throughout the Asia-Pacific region. It will deliver high-speed broadband Internet via satellite services at download speeds of up to 10Mbit/s and upload speeds to 4Mbit/s.

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Illustration: F. Rebena - devantleurvillaret

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New members join CASBAA

REGIONAL

The Cable & Satellite Broadcasting Association of Asia (CASBAA) has announced that it is expanding its membership list to include 'new economy' corporations and telcos, as well as traditional pay-TV companies.

Hong Kong-based Pacific Century CyberWorks (PCCW), which has recently unveiled the launch of its Network Of the World (NOW) service that offers converged TV-web content distributed via satellite and cable, has joined CASBAA as a Patron Member, the highest level of membership, which grants a company an automatic seat on the CASBAA Board of Directors.

Financial and business information service Bloomberg LP has in the meantime upgraded its membership from Associate status to Patron level, and will also be allocated a seat on the CASBAA Board of Directors. Other new CASBAA members include:

- AXN Action TV;
- Sunday Communications;
- Communications Systems Ltd;
- Vijay TV;
- WebArts TV.com;
- Asia Pacific Vision;
- Asia Capacity Exchange;
- CSM Sofres; and
- X [Ventures].

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NewsBriefs

REGIONAL

AsiaSat has invested in PhoenixNet, a Hong Kong-based satellite broadband service provider who has recently launched its broadband infrastructure platform on AsiaSat-3S. AsiaSat now holds 36 per cent of PhoenixNet's shares.

AUSTRALIA/REGIONAL

Global satellite carrier PanAmSat has made a request to the Australian Communications Authority to place a new satellite at 170 degrees East.

The new location would allow PanAmSat to expand Internet, video and telecommunications services throughout the Asia-Pacific.

CHINA

Vipersat Networks and Hutchison Corporate Access have entered into a Letter of Intent to form a joint venture for marketing telecommunications-over-satellite services in Greater China. The venture will operate from Hong Kong under the name World Master Resources Limited (WMR).

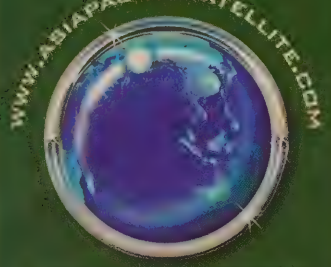
Initially, WMR will provide Internet backbone to Internet Service Providers (ISPs). It expects service and sales efforts to begin this August.

JAPAN

Japanese electronics giants Sony Corporation, Toshiba and Matsushita Electric Industrial have formed a partnership to create a standard format for Digital Television (DTV) set-top boxes and receivers for satellite TV.

Under the agreement, the three companies will develop data storage and pay-per-view technology for receivers equipped with hard-disks. The boxes will support digital satellite broadcasting services in Japan.

The companies, who have also said that they are looking for further partners in the joint venture, expect to launch services in 2001.



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Air Launch designs new low-cost rocket

RUSSIA

Having overcome a major engineering hurdle, local space engineers have begun designing a low-cost rocket that will launch satellites into low-Earth orbits after having been dropped from a transport plane.

Blueprints for the rocket will be completed this year, and the new two-stage Polyot rocket is to be manufactured and launched into space as soon as mid-2003, said Anatoly Karpov, President of the Moscow-based Air Launch Corp.

Karpov said the corporation will charge as little as US$5,000 for each kilogram of payload, just 40 per cent of what Western launch companies charge.

Robert Ivanov, Air Launch's Deputy General Designer, said that designers had solved a key problem on how to drop the 100-tonne rocket from a transport plane. Initially, the corporation's engineers had planned to build an 80-tonne rocket and drag it out from the hold of an An-124-100 Ruslan cargo plane using a set of special parachutes, he said at a news conference. However, it turned out that the largest parachutes available could pull only 20 tonnes out of an airborne plane, the designer said. Also, the corporation decided last year to increase the lift-off weight of the rocket from 80 tonnes to 100 tonnes to boost its cost-efficiency, Ivanov said.

"We were in a dilemma of whether to use five parachutes and face the risk of them getting caught up in each other or to find a safer way of dropping the rocket," Ivanov said.

Rather than struggle with parachutes, the corporation chose to develop a new technology to push the rocket out of the plane, he said. This boils down to having air pressure push the rocket out of the plane, Ivanov said. He said the rocket will be put in a special container that will be integrated into the plane. Ivanov said air pressure will be swiftly raised inside the container to literally push the rocket out into the sky at the appropriate time. Simultaneously, the plane will reach the top of a swift upward manoeuvre, when gravity is minimal, to ease the dropping of the rocket, he said. The rocket will be able to deliver a payload of up to three tonnes to polar orbits of about 200 kilometres and up to four tonnes to equatorial orbits also of about 200km. Ultimately, the rocket will also be able to launch up to 400kg to Geostationary Orbit (GEO), Ivanov said.

Air Launch Vice President, Sergei Mashurov, said in a recent interview that his corporation needs some $120 million to complete the Air Launch project. He said his company is negotiating with US, European and South Asian investors to have them shoulder the costs, but would not provide any names. Mashurov said each Polyot launch will be priced at around $20 million with a potential demand for up to 11 launches every year.

Mashurov said the costs of the project will be recovered in as little as four years if 11 launches are sold annually. The corporation, which was set up in May 1999 by Polyot airlines and the Design Bureau of Chemical Automatics, which are both based in Voronezh, central Russia, has just sent out technical requirements to its contractors and the latter are already at work on the project, Ivanov said. Among these contractors is rocket space corporation Energia of Korolyov, outside Moscow, which is to design and assemble the entire rocket and the launch container, Ivanov said. Energia is also to provide a low-temperature engine for the launcher's second stage, he said.

The first-stage engine will be provided by the Kuznetsov Scientific Technical Complex of Samara, central Russia, Ivanov said in a telephone interview. The Antonov design bureau of Kiev, which designed the Ruslan plane, is responsible for converting two of these cargo planes to accommodate Polyot launch containers, Ivanov said. Also the Pilyugin Scientific Production Bureau of Automated Engineering of Moscow is designing and will manufacture control systems for the rocket, he said. TsSKB-Progress of Samara will integrate spacecraft into the rocket, Ivanov said. Mashurov said he expects the would-be Air Launch system to win a decent share of the market for light-weight spacecraft launches. He said some 1,800 of such craft are expected to be launched between 2000 and 2015 for a total of anywhere between $10 billion to $15 billion.

Historic launch of Sirius-1 successful

US

International Launch Services (ILS) has successfully launched the first satellite for Sirius Satellite Radio. Sirius-1 was launched on 30 June 2000 by a Proton/Block DM launch vehicle from the Baikonur Cosmodrome in Kazakhstan.

The digital audio radio service satellite was successfully launched into Geosynchronous Transfer Orbit (GTO) under the auspices of ILS by a combined US and Russian team.

The satellite is the first of a three-satellite Sirius constellation, and it is the first satellite ever designed to deliver digital satellite radio broadcasts to the US.

As of the end of this year, Sirius-1 will deliver 50 channels of commercial-free music and up to 50 channels of news, sports and information seamlessly across the continental US, said an ILS statement.

Robert D. Briskman, Sirius Executive Vice President (VP), said: "The successful launch and deployment of Sirius-1 is another major step towards the realisation of our satellite network".

The other two satellites in the Sirius constellation are also scheduled to be launched aboard Proton rockets by November this year.

The Sirius satellites are custom-designed for satellite radio and are the first in the world to use the S-band for satellite delivery of audio content, said ILS.

Sirius Radio receivers will be available in 2001.

Photo: ILS

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Comsat to support US Antarctic programme

US

Satellite communications service provider and subsidiary of Comsat Corporation, Comsat General, has announced the signing of an agreement to provide satellite data communications to the Amundsen-Scott South Pole Station, which is located at the centre of Antarctica.

The communications services that are to be performed by Comsat will supplement existing coverage provided by other US government satellites. The additional satellite data communications will enable scientists to rapidly and efficiently transfer scientific data gathered every day, according to a statement made by Comsat.

The agreement is the second part of a two-phase project that began in February 2000 with the relocation by Comsat of the MariSat-F2 satellite to a new Geosynchronous Orbit (GSO) location over the Atlantic Ocean.

The new contract is for one year and includes four one-year options, with the potential for service through to May 2005.

Astrium awarded contract for Hot Bird-7 satellite

EUROPE

Space company Astrium and European operator EUTELSAT have signed a contract for the fast delivery of an additional Hot Bird satellite. The satellite will be positioned at 13 degrees East Geostationary Orbit (GSO), which will enable EUTELSAT to substantially increase its direct television capacity in the orbit location, said Astrium.

Hot Bird-7, which will be entirely built by Astrium, will have a launch mass of approximately 3.3 tonnes and a life span of 15 years. It will carry a payload of 40 Ku-band transponders.

The satellite will be equipped with a Super Widebeam over Europe, North Africa and the Middle East, as well as being equipped with two steerable spotbeams that will be pointed outside Europe to support EUTELSAT's expansion in new geographical areas. Giuliano Berretta, EUTELSAT's Director General said: "This new Hot Bird satellite will enable us to continue our geographical expansion outside Europe and to begin to redeploy existing Hot Bird at other orbital locations".

Over 80 million homes in Europe, North Africa and the Middle East receive TV delivered by the Hot Bird satellite constellation.

Intersputnik launches Express-3A satellite

RUSSIA

Russia's Express-3A satellite was launched successfully on 24 June 2000, and it is the second Express-3A series satellite in the Intersputnik space segment.

The Express-3A spacecraft lifted off Kazakhstan's Baikonur Cosmodrome aboard a Proton launch vehicle. It will be deployed at an orbital position of 11 degrees West, replacing the aging Statsionar-11.

Express-3A consists of 17 high-power C- and Ku-band transponders, which will primarily be used for high-speed Internet access channels to North America, and the Middle East and Africa from Europe.

The new Express-3A follows on from Express-6A, the first satellite in the Express-A series that was put into commercial operation on 25 May.

Gennady Kudryavtsev, Intersputnik's Director General, said: "The introduction of the second express-A series satellite in the Intersputnik space segment will allow us to offer our clients a wider range of telecommunications services - meeting requirements for the new millennium". He added: "Express-3A will provide Intersputnik with capabilities to offer more satellite channels to telecommunications companies interested in trans-Atlantic flight."

MultiChoice and EUTELSAT in Africa pay-TV deal

EUROPE/AFRICA

Pay-TV operator and provider MultiChoice has secured three transponders on EUTELSAT's W4 satellite with plans to book an additional four transponders. The W4 satellite, which went into service on 1 July 2000 at 36 degrees East, will host a Direct-To-Home (DTH) TV service for MultiChoice.

Twelve of the 31 transponders on the new satellite are dedicated to the African market via a fixed beam that covers countries in sub-Saharan Africa, and a steerable beam pointed over west Africa.

Ian Tennant, MultiChoice Chief Executive Officer (CEO), said: "As the first satellite operator to service sub-Saharan Africa with Ku-band capacity EUTELSAT made MultiChoice a compelling offer with its new W4 satellite".

Tennant added that W4 opens new commercial opportunities for MultiChoice in west Africa and the Indian Ocean islands.

The channels to be broadcast in the MultiChoice platform on W4 include sports, news, entertainment, films and kids channels.

EUTELSAT has also announced that Russia's NTV-Plus has begun broadcasting on the W4 satellite.

EMS awarded Inmarsat-4 contract

EUROPE/CANADA

Canada-based EMS Technologies Inc (EMS) has announced that Astrium has selected it for a US$25 million contract to supply three combined transmit/receive antenna feeds for the Inmarsat Broadband Global Area Network (B-GAN) programme.

Astrium, the European consortium building the B-GAN's Inmarsat I-4 satellites, recently won the $700 million contract to build three satellites for Inmarsat's fourth generation broadband satellite network.

Work on the advanced technology behind the 600 satellite spotbeams that will power the B-GAN is set to begin.

The Inmarsat B-GAN will consist of three I-4 satellites, each of which will feature 200 spotbeams generated by the EMS combined transmit and receive antenna feeds. The B-GAN will give corporate customers high-speed Internet access at up to 432kbit/s, Video-on-Demand (VoD), fax and e-mail across the world.

EMS's multi-element antenna feeds are considered to be one of the most challenging aspects of the Inmarsat B-GAN programme and are the first major sub-system to be awarded by Astrium.

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CIRCLE 16 FOR FURTHER INFORMATION

INTELSAT launches new broadband VSAT service

EUROPE

Global communication satellite system operator INTELSAT has launched a Broadband Very Small Aperture Terminal (VSAT) service, an advanced bandwith-on-demand system allowing corporate network and Internet Service Providers (ISPs) to offer cost effective and rapidly deployable high-speed communications solutions, said the company.

The new service promises high-speed connectivity for a variety of network topologies and hybrid solutions to support customers' wideband application needs, including Wide Area Network (WAN)/Local area Network (LAN) interconnections, videoconferencing, multicasting, tele-education and tele-medicine.

Broadband VSAT is currently available to INTELSAT's customers in the Americas, Europe and Africa, thanks to the IS-801 satellite located at 328.5 degrees East. Near-global coverage is expected by mid-2001 following the launch of the IS-902 satellite in the first quarter (1Q) 2001, which will be located at 62 degrees East respectively.

The service is based on Comsat Laboratories' LinkWay platform and offers bandwidth in the C- and Ku-band frequencies using INTELSAT's existing fleet of satellites. Comsat won the equipment contract earlier on to provide the networking terminals and the network management infrastructure for the VSAT service, as well as subsequent technical and maintenance support. The service provides virtual circuit-based connections starting at 64kbit/s with maximum data rates of up to 4Mbit/s, said INTELSAT.

Inmarsat changes name

UK

Global satellite network operator Inmarsat has announced that it has changed its name to Inmarsat Ventures Ltd from Inmarsat Holdings Ltd. According to a company statement, the change was introduced to reinforce the company's strategy to pursue broader operations and technology developments in the fixed satellite service arena and through content and solution delivery, while at the same time continuing to build its global mobile satellite communications business.

Since January this year, Inmarsat has broadened its total satellite service portfolio, entering the fixed satellite market by providing Very Small Aperture Terminal (VSAT) system integration solutions and investing in a fourth generation satellite constellation. Michael Storey, Inmarsat's President and Chief Executive Officer (CEO), said: "The move to Inmarsat Ventures reflects our vision of the significant opportunities in satellite telecommunications technology. The change to 'Ventures' emphasises Inmarsat's strategy of continuing to invest in the development of new celestial telecommunications technology and the acquisition of companies that expand our product and service portfolio and global capabilities".

Inmarsat changed from being an intergovernmental organisation to become a private limited company in April 1999.

SES invests in Kokua

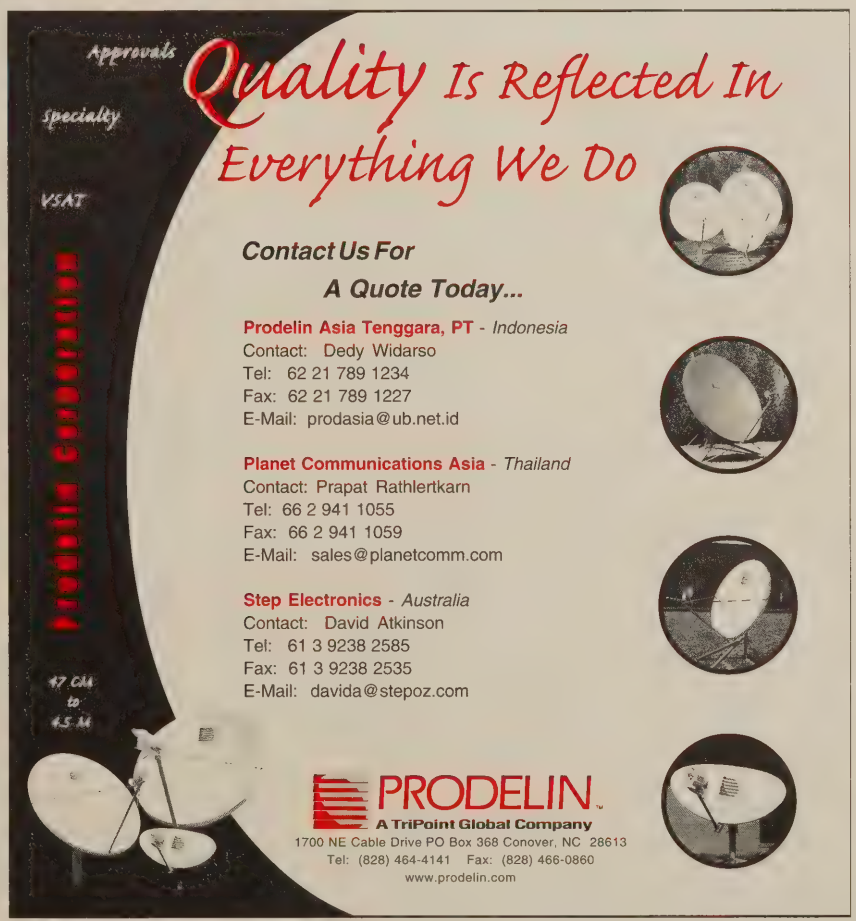
EUROPE/UK

Kokua Communications Inc has received a strategic investment from satellite operator Société Européene des Satellites (SES), a move that gives Kokua added momentum as it approaches the launch of its broadband connectivity services in November 2000, said the company.

Kokua's service is poised to offer high-speed, two-way Internet connectivity and value-added solutions targeting Small to Medium-sized Businesses (SMBs), remote sites of large corporations and Small Office Home Offices (SOHOs). Services will initially be available in the UK in November this year with a subsequent rollout across Europe in 2001.

The two-way broadband Internet access service will also allow users to receive Internet via satellite at speeds of up to 38Mbit/s, as well as communication back to the Internet at speeds of up to 2Mbit/s.

The service will utilise Ka-band capacity on the ASTRA satellite constellation that comprises of nine active satellites located at the 19.2 degrees East and 28.2 degrees East of longitude orbital positions. Four additional satellites for the Astra fleet are under construction and scheduled to be launched before the end of 2001.



CIRCLE 11 FOR FURTHER INFORMATION

A niche market, but growing

In a new study entitled 'World broadband satellite equipment market', Frost & Sullivan explores the potential for such a market. Giovanni Verlini, Editor of Asia-Pacific Satellite, *had a look at the report's findings.*

ACCORDING TO A newly-published study by Frost & Sullivan entitled 'World broadband satellite equipment market', the emergence of new service platforms used for the delivery of data and Internet services is set to spur the use of new broadband satellite user terminals. In this regard, the price and quality of satellite-delivered multimedia services is of paramount importance if these satellite systems have to compete with landline technologies.

The implementation of two-way interactive services via satellite will be facilitated by the development of Ka-band systems. Such services are expected to enhance broadcasting, Internet and business communications by using high-power spotbeams to provide pan-regional broadcast and telecommunications applications.

As far as technology is concerned, the next challenge is represented by the development of service applications in the V-band frequencies, which are expected to support inter-satellite links, on-board processing and high-powered spot beams. Other service innovations on the horizon include video multimedia and multicasting applications.

Naturally, new services and technologies require the development of a new breed of satellite systems capable of delivering two-way digital communications. In addition to conventional satellites on Geostationary Orbit (GEO), systems operating in both Low Earth Orbit (LEO) and Middle Earth Orbit (MEO) are expected to be deployed to provide global services. A new generation of broadband communications satellites will operate in Ka- and V-band frequencies. In particular, with the launch of next-generation broadband satellite systems like Astrolink and Spaceway starting in 2001, the market for broadband satellite terminal equipment is expected to take off.

Market growth and opportunities

The prevailing business case is to tap lucrative areas, such as businesses and home users in developed markets. For the US, the forecasts reflect a flat rate pricing plan arrangement by service providers. For the rest of the world, the forecasts are based on existing service provider arrangements of double charging, where access charges are paid to the Internet Service Provider (ISP) and per minute charges are paid to the telecommunications operator (telco).

The ready-available infrastructure and wide area reach of satellite technology is a major asset for the industry, as broadband satellites essentially provide instant infrastructure to the end-user. Broadband satellites are thus well positioned to service the high bandwidth requirements of developed countries as well as developing countries, where there is a severe inadequacy of landline alternatives.

Additionally broadband satellites represent the only feasible solution for servicing far-flung corporate sites such as oil fields, oil rigs and mining stations.

Frost & Sullivan expects the market for broadband satellite equipment to be driven by a number of factors, including:

- The growth of the Internet, including e-commerce and e-business;
- The growth in bandwidth-heavy applications;
- The deregulation of developing country markets; and
- The development of broadcast/multicast applications.

At the same time, the US-based consultancy identifies a number of restraints to the expansion of the same market. These are:

- Limited financial capability of the customer base;
- Low Personal Computer (PC) penetration rates in key markets;
- Improving landline infrastructure and local loop technology;

Analysis of demand

In the information age, where e-commerce will be central to the transition from the old to the new economy, access to the Internet is essential for the participation of the changing global economy and economic progress. Broadband satellite networks are especially attractive to markets where terrestrial-based infrastructure is inadequate or non-existent. In fact, satellite terminals are expected to persist in areas where the 'digital divide' needs to be bridged.

These markets include both developing countries as well as the rural and underserved areas of developed country markets. According to Frost & Sullivan, the market for satellite-based broadband terminals is expected to be a niche one, at least until 2006. The demand for satellite broadband capacity is expected to come from: those areas that are underserved by cable systems; where existing VSAT networks need to be overlaid with newer two-way networks or 'swapped' for more robust broadband terminals; where there is new demand for one-way VSAT networks; end-users such as ISPs, which utilise satellites for point-to-multipoint, caching, streaming and multicasting applications.

In terms of regional distribution, the broadband terminal market is expected to remain largely in the developed countries of the globe to serve rural and underserved

Table 1: Total broadband satellite equipment market

	Units (000)	Revenues (US$ m)	Revenue growth rate (per cent)
1999	72.5	103.3	-
2000	148.0	198.3	92.0
2001	266.0	332.5	67.7
2002	410.0	497.0	49.5
2003	590.0	691.4	39.1
2004	815.0	910.6	31.7
2005	1,100.0	1,114.9	22.4
2006	1,400.0	1,257.5	12.8
Cumulative	4,801.5	5,105.7	/

Compound annual growth (1997-2006): 42.9 per cent

Note: all figures are rounded. Source: Frost & Sullivan

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areas. In addition, the regional breakout also reflects the high take-up rates of countries in regions such as Asia to provide instant infrastructure (see Table 2).

Virtually every company in the satellite industry is developing products and services aimed at tapping the Internet market. In 1996, less than ten companies were involved in the marketplace offering Internet via satellite services. By January 2000, the number of companies grew substantially, including operators as well as companies involved in Internet access services, caching, streaming, multicasting and specialised distribution services. Currently, the two dominating products in the market are the DirecPC product line by Hughes Network Systems (HNS) and Gilat's SkyBlaster product line. In particular, SkyBlaster is a true two-way satellite terminal that provides instant infrastructure to remote and under-served locations.

Table 2: Total broadband satellite equipment market (%)

	North America	Europe	Latin America	Asia-Pacific	Africa & Middle East
1999	79	14	0	7	0
2000	68	17	3	10	2
2001	56	19	6	17	2
2002	51	20	7	20	2
2003	47	20	10	19	3
2004	44	21	12	20	3
2005	42	20	14	20	5
2006	40	19	15	19	7
Cumulative	**45**	**19**	**12**	**19**	**4**

Note: all figures are rounded. Source: Frost & Sullivan

Conclusions

According to Frost & Sullivan, satellites for broadband applications can be considered as a niche solution, and are likely to remain so until the end of this report's forecast period. However, this niche market is expected to grow at moderate-to-high levels as technological improvements and a decrease in prices will lead to end-user appeal worldwide.

The key technology innovation in the field is the introduction of two-way systems, which provide the instant infrastructure advantage that satellite technologies are supposed to deliver. Two-way terminals are currently in high-demand specifically for e-commerce applications.

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The 'bath tub line'

David Todd, Space Analyst at UK-based Airclaims investigates the reliability of geostationary satellite platforms.

RECENT STUDIES BY ourselves and some insurance underwriters have examined the failure rates of launch vehicles for maiden and early flights of both new and radically altered rockets - in AGF's study the first five flights of each rocket were considered.

We came to the conclusion that, apart from direct conversions of military missile systems, maiden and early flights were inherently risky, with maiden failure rates in the 40-50 per cent region. This is a much higher record than the standard 'all-cause failure rate' of all rocket launches to Geostationary Orbit (GEO), which is approximately 14-15 per cent. And what about satellites? AGF has carried out a study of the first flights of major bus designs in order to establish whether there is a worsening trend with modern satellite designs. They came to the conclusion that such a trend does not exist. But are early satellites of a new bus design any less reliable than later satellites in the series? In order to answer this question, we performed a study using SpaceTrak data (see table). As to the criteria employed in the study, we established that any anomaly or failure that leads to an insurance loss is our failure criteria, while only 'modern satellites', those with designs whose date of launch is post-1990, were taken into considerations.

Thus we can examine modern commercial bus designs available for geosynchronous/geostationary satellites and check their 'snapshot' insurance failure rate - number of failed satellites versus number launched. We can do this if we make the valid assumption that commercial bus designs are usually all insured for at least part of their life in-orbit. The rate is a 'snapshot' and it should be remembered that the test is still in progress. Satellites are constantly entering and leaving the test as they are launched or they retire - and not usually at the same rate.

For example, if we take the HS-601HP and examine its first five flights:

- In-orbit insurance satellite loss rate for early satellites: 2/5 = to 40 per cent; and
- In-orbit insurance satellite loss rate for all satellites launched: 2/13 = to 15.4 per cent.

As can be seen in the table, the maiden flight did lead to an insurance loss. In fact, two of the five earliest satellites led to an insurance loss, which is relatively bad in percentage terms when compared to the rate of 15.4 per cent of all those launched.

Conclusion

As can be seen in the table, the current 'snapshot' indicates that there is a slightly higher risk of anomaly or failure causing an insurance loss in the early flights of a new satellite compared to all flights.

For maiden flights of new bus designs, the failure rate rises to five out of 16, which equals to 31 per cent. Maidens do seem to represent a higher risk when compared to the standard rate for all flights of all the buses. Each 'loss' for early flights averages US$57 million in insurance claims - approximately 20 per cent (0.2) of the total insured value of a satellite today.

Considering this early satellite 'average' insurance loss as a global factor across all insurance losses, then by multiplying this figure by the approximate percentage risk of failure in-orbit we have an approximate burn rate for 'total loss' in-orbit for modern satellites. This means: 0.165 x 20 per cent equals to 3.3 per cent of early launched satellites. This is about one total in-orbit loss per year given that 20-30 insured geostationary satellites are launched per year.

Table 1: comparison of in-orbit insurance satellite loss rates

Bus design (maiden in orbit losses in bold)	Insurance loss satellite rate for early satellites	Insurance loss satellite rate for all satellites	Total insurance loss value of losses in early flights (US$ million)
HS-601	1/5 (20%)	6/36 (16.7%)	180
HS-601HP	2/5 (40%)	2/13 (15.4%)	261
HS-702	0/1 (0%)	0/1 (0%)	-
HS-376HP	1/4 (25%)	1/4 (25%)	1
A2100	0/4 (0%)	0/4 (0%)	-
A2100AX	1/5 (20%)	1/5 (20%)	219 (under arbitration)
A2100AXX	0/1 (0%)	0/1 (0%)	-
LM-5000	2/4 (50%)	2/4 (50%)	147.5
LM-7000	2/5 (40%)	3/11 (27%)	180
LS-1300 extended	0/2 (0%)	0/2 (0%)	-
Eurostar 1000	0/4 (0%)	0/4 (0%)	-
Eurostar 2000	2/5 (40%)	2/8 (25%)	32
Spacebus 2000	0/5 (0%)	0/6 (0%)	-
Spacebus 3000A	0/4 (0%)	0/4 (0%)	-
Spacebus 3000B1	1/2 (50%)	1/2 (50%)	8
Spacebus 3000B2	0/4 (0%)	0/4 (0%)	-
Totals	***12/60 (20%)***	***18/109 (16.5%)***	***1,028.5***

Source: Airclaims

Note: the standard LS-1300/FS-1300 was initially launched before 1990 and has a total rate of 4/22 = 18 per cent; The above study takes no account of satellite related failures during launch; Although included in this analysis some losses in orbit are as the result of the communications/observation payload going wrong. These are usually custom-built for each client and are not really part of the bus design.

This should be regarded as a rough first approximation to the risk. The actual failure rate will rise from above the 16.5 per cent snapshot rate quoted, as some of these insured satellites will fail later in life.

In the study of early flights nearly three quarters of in-orbit losses were found to occur in the first two years, and an insurer would be wise to bias the rate towards the front of the life. Like for humans and other complex systems the 'bath tub curve' holds true when loss rates are compared to time. The highest loss and anomaly rates usually occur in the early and late periods of life.

Normally, satellites have a comfortable and safe period in the middle years of their lifespan.

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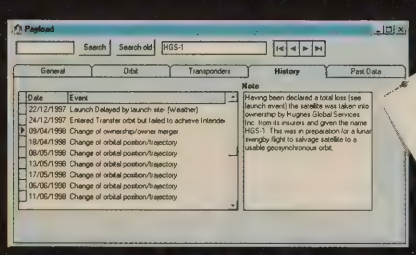

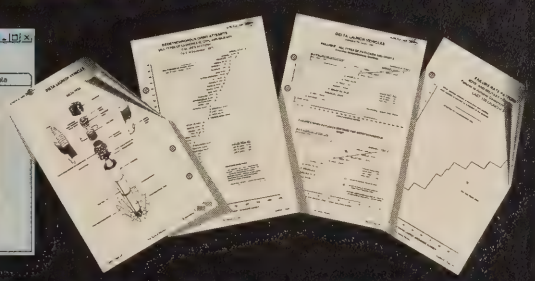

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Space Review is a user friendly industry reference manual on space launch systems. Supplied in a loose leaf hardcopy format, updated monthly, it provides: Detailed information on successes/failures in the launching/positioning of satellites; reliability trends; past/future launches; satellite launch events and in-orbit event histories.

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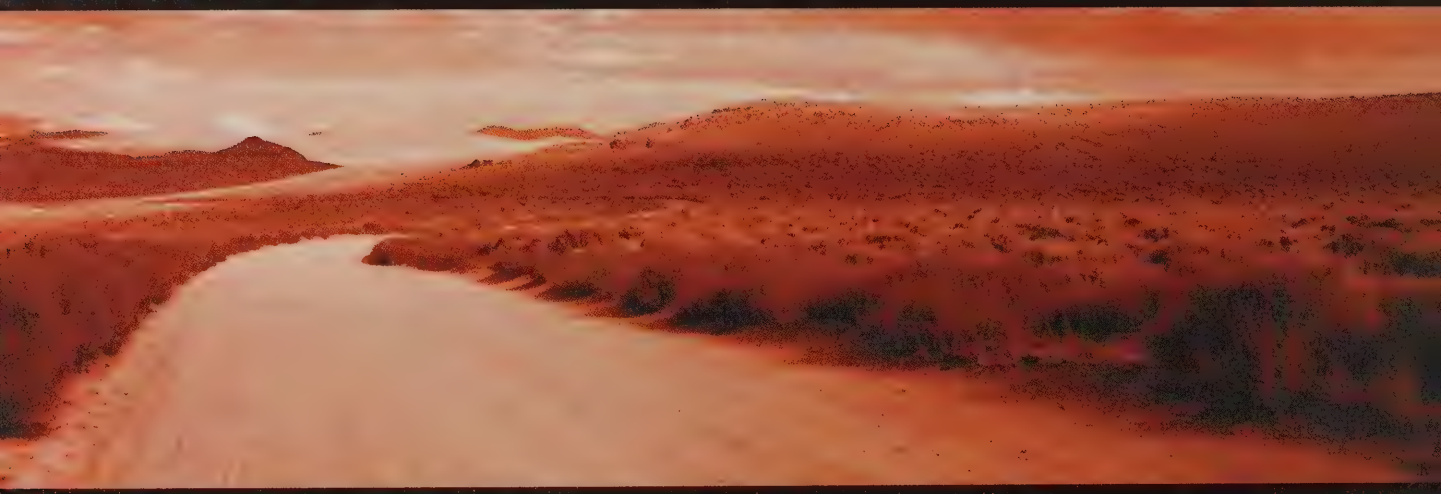
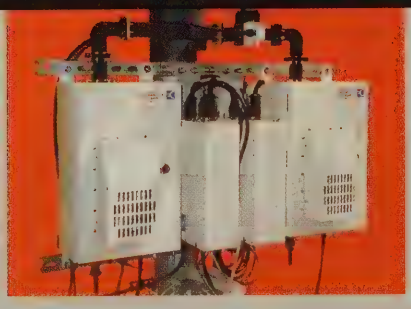
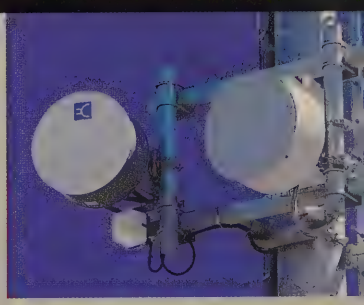
No Boundaries



No Worries





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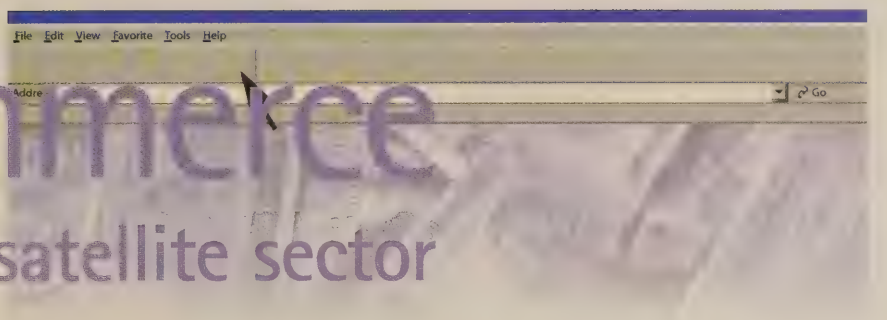
E-commerce for the satellite sector



Giovanni Verlini, Editor of* Asia-Pacific Satellite, *explores the potential of the Internet as a marketing tool for satellite companies, as well as a means for developing online marketplaces where satellite capacity and services can be traded.

MOST, IF NOT ALL, satellite experts these days are familiar with the changes in the satellite industry that have been triggered by the rise of the Internet. They will be able to tell you how the World Wide Web (WWW) is revolutionising the satellite sector, how Internet Protocol (IP) is imposing itself as the new global platform for satellite communications and how satellite operators worldwide are planning to launch broadband spacecraft dedicated to Internet traffic.

However, while most satellite experts are aware of the numerous technical issues regarding the delivery of Internet services via satellite, not all of them would be able to tell you much about how the Internet is affecting the satellite industry's financial and commercial sectors.

The Internet, in fact, is in the process of hitting the satellite industry marketplace in the same way it is hitting other industries. In particular, the Internet offers a splendid new medium through which to transact business on a global basis. Business-to-Business (B2B) transactions carried out on the Internet will help satellite companies to streamline their operations. In fact, procurement efficiency in global corporations is one of the biggest challenges for a company in today's market. Organisations spend a large percentage of their turnover for either the procurement of indirect goods or the purchase of production-related direct goods. B2B procurement conducted via the Internet is widely recognised as a major step towards both increased process efficiency and reduced purchase prices.

As a consequence, companies will increasingly use the WWW to implement full supply chain integration, conquer new markets and benefit from increased market transparency. This market is destined to grow steadily. According to a study conducted by Forrester Research, the value of goods and services purchased by corporation via the Internet is estimated to reach US$1.5 trillion by 2003. *Asia-Pacific Satellite* reports on four on-line marketplaces that are dedicated to the satellite industry.

E-sax.com

One of the most prominent players in Internet e-commerce for the satellite industry is the London Satellite Exchange, created by the French entrepreneur and satellite veteran Frank Genin.

E-Sax.com, the online arm of the London Satellite Exchange, is the first B2B global online marketplace for the satellite industry. The site will link prospective customers to satellite space and ground segment operators, as well as offer online and off-line satellite capacity trading, regulatory consulting services, network consulting, design services and related equipment sales.

Traders will provide real-time, unbiased space capacity bandwidth trading to satellite service providers, both on and off-line, seeking to offer the best coverage at the best price. Satellite professionals in search of ground-segment hardware teleport services online will be able to rely on the Exchange's consultancy arm for help.

The official launch of the Exchange is scheduled to take place at the 'World Summit on Financing for Satellite Communications and Broadcasting', which will be held in Paris, France, on 31 August to 1 September 2000.

Recently, the London Satellite Exchange has announced that it has received $4 million in funding from Whitney & Co of Stamford, Connecticut, US, and Bullnet of Madrid, Spain.

[See interview with Frank Genin in this article]

SatCap.com

SatCap.com is an Internet-based marketplace for the satellite communication and broadcasting industry. The company was founded in 1999 in Sweden and completed its first stage funding in January 2000. SatCap.com will initially launch its marketplace in the European market, but is planning to launch its services in the US and Asian markets within 12-18 months.

SatCap.com will provide an Internet marketplace where international buyers and sellers of satellite transponder bandwidth, and uplink and downlink capacity, can meet and conduct business transactions. The services are aimed to satellite operators, Satellite News Gathering (SNG) truck providers, teleports, broadcasters, sport agencies and telecoms operators. A customer utilising SatCap.com has the following advantages:

- Better utilisation of satellite transponders and SNG trucks;
- Lower search and distribution costs;
- Faster response to requests;
- Better access to companies demand and supply of transponder capacity; and
- Trade of excess satellite bandwidth and transmission.

SatCap.com will charge a commission fee on the contracts traded.

Iacto.com

Iacto has established a marketplace for the global broadcasting industry to do business. Within this marketplace, Iacto will help its customers sell excess capacity or buy broadcasting services on short notice. The marketplace can be accessed via telephone - both buying and selling capacity, while the system guarantees integrity at all times for both buyers and sellers.

Basically, Iacto acts as an agent, connecting buyers and sellers. Once a company agrees to a buy or sell, Iacto provides the relevant contact information for the two parties to continue communica-

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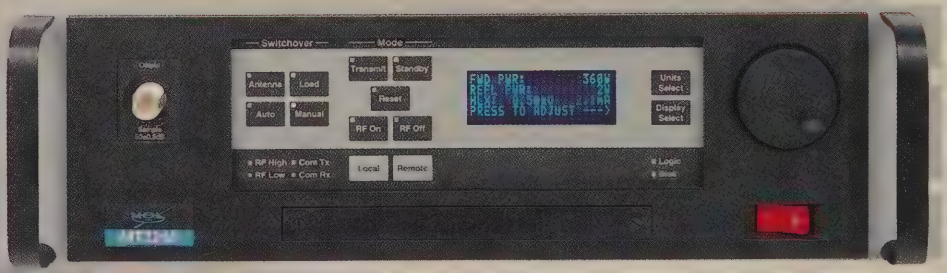

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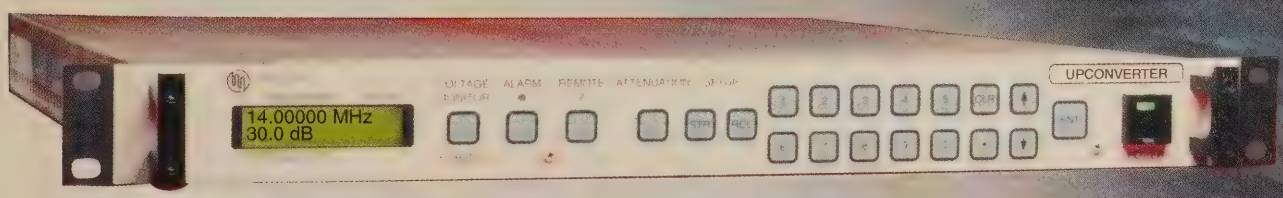

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tion and to foster long-term relationships. Iacto's business idea is to help players in the broadcasting industry to rationalise the process of sales and purchasing and thereby increase profitability by providing customised telephone services and an Internet-based marketplace.

Iacto will provide its clients with immediate and relevant information about service providers and potential customers to facilitate better business. Iacto will create a meeting place where this information can be exchanged.

This means that Iacto will, free of charge, search the global network for the best possible broadcasting solution for the customer. As a customer you have the freedom to choose the company that will be delivering the requested services. When Iacto has found a suitable service provider the contact between customer and service provider will continue in the traditional manner so that long-term relations are fostered.

Iacto currently provides a marketplace for mobile uplinks, production facilities and other broadcasting services. At present, only the mobile uplink marketplace is available on the Internet. Other marketplaces will be established on the Internet in the coming months. All of the marketplaces are available via the customised telephone services.

By using Iacto's services, an operator will have the following benefits:

- Improve the utilisation of broadcasting capacity;
- Increase the effectivity in purchasing and sales processes;
- Save time and liberate internal resources for core business;
- Get contacts at unknown potential customers;
- Get faster response on requests; and
- Improve access to companies' supply and demand of broadcasting capacity.

Telbizz.com

Thanks to Telbizz.com, telecommunications, multimedia and related companies in Europe, the Americas and the Asia-Pacific region can now tap into a growing pool of more than 1,200 suppliers of telecommunications products in Asia.

The company was formed in March 2000 in Singapore as a wholly subsidiary of Newtron AG, a leading provider of Internet-based trading systems for vertical marketplaces in Europe. It quickly signed Deutsche Telecom Asia as a partner, and it has created a separate e-procurement marketplace for Deutsche Telecom Asia International Procurement Office (IPO).

Speed is one of Telbizz.com's main operating philosophy. While the majority of B2B e-procurement providers take at least three months to set up a marketplace, Telbizz.com uses its proprietary scalability solutions that allows it to set up marketplaces in 45 days.

What makes Telbizz.com different over comparable B2B e-procurement providers is also its ability to offer telecommunications procurement consulting for its buyers. Its team of telecommunications consultants can provide advice and assistance in their purchase of telecommunications technologies. This unique consulting service breaks the impersonal e-procurement mould that most marketplaces offer.

Buyers can draw on the consultants' experience in developing concepts, evaluating suppliers and taking on export finance. Telbizz.com can also direct buyers to new channels of suppliers or alternative products when there is a shortage of parts. Telbizz.com's consultants can also recommend telcos to Asian suppliers for new technologies.

Interviewed at CommunicAsia2000 by *Asia-Pacific Satellite*, Silvio Stockmann, Managing Director of Telbizz.com, said: "We have chosen Singapore as our regional headquarters because it is the gateway to Asia. In addition, the Asia-Pacific region is home to most of the key telecommunications equipment suppliers. With the liberalisation of the telecommunications industry in Singapore, the opportunities are greater than before.

"We have signed on Deutsche Telecom Asia, and we are already in advance stage of discussion with other telcos in the region. We are confident that our expertise and technology will allow us to build marketplaces that will add value to customers."

The Internet is changing the satellite industry profoundly.

A virtual place for real business

Giovanni Verlini, Editor of Asia-Pacific Satellite, *talked to Frank Genin, Chief Executive Officer (CEO) of the London Satellite Exchange Ltd.*

Question: How does the London Satellite Exchange work?

Frank Genin: The London Satellite Exchange will work according to the well-established working rules of an exchange: we want to create a marketplace, in this case for the satellite industry, whereby we bring buyers and sellers together, at the best price, who might have not found each other otherwise.

The Satellite Exchange is innovative in the sense that we will actively use the Internet as one of our tools. This Business-to-Business (B2B) online market place will be operating under the name *e-sax.com*.

You see, in today's satellite market, there is a need for a communal forum where business can be done easily and freely. What we do is offer them a neutral and independent marketplace where confidentiality is guaranteed.

Q: When did you have the idea to establish an Exchange for the satellite market?

FG: I toyed with the idea for about two years but had to wait for the market conditions to be right. Recently, there has been a change in companies' attitudes towards electronic commerce (e-commerce) thanks to the media's attention for everything and anything to do with the Internet. Despite the negative publicity created by some failures in the dot.com start-ups, I think we can all agree that business will never be the same and that e-commerce is a force to stay which all of us have taken into account when creating a business. A wealth of opportunities is being created and we have only seen the top of the iceberg.

In my opinion, many Internet companies have gone wrong because they have switched from one extreme to the other, blinded by the pot of gold offered by the Internet and forgetting some basic business rules. The clients still like to put a face to a voice and maintain a 'personal' link, which is one of the reasons why we will also have a live trading floor where business can be done off-line. It will be an exciting cocktail of the old and the new business rules.

Q: Where did you find the financial backing for this idea ?

FG: Our major investors are US venture capitalists Whitney & Co and Bullnet, a Madrid-based Internet investment fund. Both support innovative ideas, which capitalise on attractive market opportunities and which are therefore somewhat different to the more conservative mainstream business opportunities.

Q: What kind of services will you offer?

FG: Our traders at the London Satellite Exchange will offer off and online exchange facilities with regards to:

- Space bandwidth leasing;

A virtual place for real business...continued

- Ground segment procurement; and
- Rocket launch procurement - secondary payloads.

They will do so on a real-time, unbiased and first-come, first-served basis.

Q: Can you expand on these three lines of activity?
FG: With the space bandwidth spot trade, we provide a solution to those companies that are looking for space capacity. On the other hand, the ground segment procurement activity is for those companies that already have some bandwidth available.

Of course, there might be companies that are looking for both space capacity and ground services. This means that the satellite exchange is the place those companies can contact to find end-to-end solutions.

As to launch procurement, we will offer this service to secondary payloads only ie, payloads with mass under 300kg. Finding matching small payloads at an affordable price, launch window and appropriate orbit is a difficult combination in today's market; we help customers and launchers solve this problem.

Q: Are there other services that you are planning to offer?
FG: Yes, of course, I can think of risk management for instance, but the timing of such services has to be right. We initially will focus on what we set out to be our core-business and will at a later stage venture into additional activities.

Q: What is your role in all this?
FG: I like to think of ourselves as being a one-stop-shop. Our traders are highly skilled engineers with expertise in satellite telecommunications, design, installations, operations and solutions, which enables them to follow through the whole process of obtaining the requirements, preparing the technical survey, opening the bidding, preparing the link budget, pre-negotiating the contract terms and finally bringing the two parties together in a well defined framework. This is on the buyers' side.

On the other hand, on the sellers' side, we can offer extra leads and in this way complement the existing sales teams of most companies.

Q: So where will you get your income from?
FG: We will obtain a brokerage fee from the vendors, which in effect will be a 'success fee' that is essentially a percentage on the deals carried out through the exchange.

Q: Who are your members?
FG: Our members are suppliers and satellite service providers.

Q: Are you focused on a particular geographical area?
FG: We have a very strong global presence, generally speaking, with our members coming from all over the world. In particular, our presence in the Asia-Pacific region is extremely solid and we have a strategic partnership with the Asia Capacity Exchange (www.ace-asia.com).

Frank Genin, CEO of the London Satellite Exchange

Currently, almost all of the major regional satellite players that operate in the region are on-board.

Q: What share of your activities will the Asia-Pacific region represent?
FG: It is difficult to estimate this at the moment as we have not fully launched yet but we expect the Asia-Pacific region to represent between 20 and 25 per cent of our turnover.

Q: How important is the Internet for you? Could the London Satellite Exchange exist without the Internet?
FG: We expect the vast majority of the transactions to be carried out online. The Internet is a marketing tool of paramount importance to us. Our website will become the first stop where information can be obtained, but also were transactions will be finalised.

Q: Why did you choose London as the place to found the Satellite Exchange?
FG: We chose London because it is the financial capital of the world and therefore has an environment that is particularly receptive to new ideas.

Additionally, the fact that we are based in London carries a distinctive geographical advantage. In the morning it is possible to communicate with Asia whereas in the afternoon it is perfectly feasible to do business with America without upsetting the normal office hours too much. This is important, as we will be a global exchange.

Q: Is it not unusual to open a trading floor as we see that most exchanges have closed their floors ?
FG: Our experience teaches us that the Internet can help us to speed up the process but that it remains important to add a personal touch to the business you do. Especially, when we are being asked to offer an end-to-end solution there will be a lot of interaction with our members via the more traditional ways of communicating.

This is the reason why we are investing a great deal in interactive software to give the trading place a human touch such as web cams, live chat and call-me-back.

Q. And what is the next step ?
FG: Today, as London Satellite Exchange we are in the process of launching our online service with our team of 11. Currently, we have six satellite brokers, three website engineers, one marketing representative and an accountant.

The online exchange facility will become operational as of 1 September 2000, while the live trading floor will be inaugurated during the fourth quarter of the year 2000. We will launch the Exchange on 1 September at the 'World Summit on Financing for Satellite Communications and Broadcasting' which will take in Paris.

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In the mood for consolidation

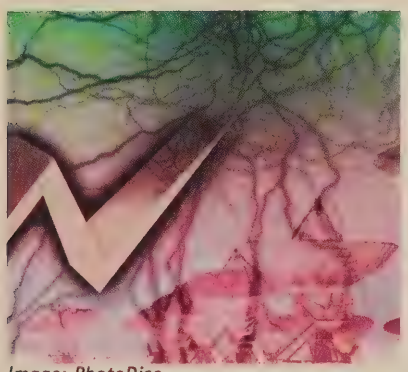


Image: PhotoDisc

Brian Ackroyd, Correspondent of Asia-Pacific Satellite, explores what seems to be the latest business trend in the satellite arena, spanning across the board from satellite manufacturers to Mobile Satellite Service (MSS) operators: consolidation.

ALL SECTORS OF the satellite industry have enjoyed a resurgence in the past few years. The growth in the demand for wideband communications, fuelled by the growth of the Internet and the need for broadband access, has led to the development of new technologies. These technologies are opening up the potential of satellites to a wide variety of new applications, including broadband services, remote sensing, positioning systems, wide area mobility and the inter-working of satellite and terrestrial systems. Growth forecasts, which take into account these new developments, vary widely, but at its lowest the satellite industry is forecast to grow from around US$10 billion in 1998 to $16 billion by 2003.

To meet this challenge, the satellite industry had to change itself, following, to a large extent, the current trend common to many industries where mergers or take-over activity is leading to increasingly bigger groupings. Generally, companies join forces to quickly bring together strengths and skills that will allow them to compete, successfully and effectively, in a market sector. Other times, the reason for coming together is to preserve the skills and resources of an ailing company.

A favourite phrase in the 1980s was 'concentrating on core activities', which meant that companies decided what their real business was and then divested themselves of technology divisions that were not perceived as part of their core business. Consequently, these companies used specialist external contractors to perform those functions that were not part of their core business. On the other hand, in today's economy, company size is seen as a necessity if a player has to compete in a global marketplace. The quickest way to increase a company's size is to buy in other companies, so that the technology elements required to compete at a global level can be brought together.

The manufacturing sector

Currently, satellite manufacturers are involved in a broad overhaul of their production processes of payloads while platform technology is being designed to make satellites increasingly 'intelligent'. If Low Earth Orbit (LEO) systems are to become the dominant satellite form, then manufacturers are likely to continue to go down the road of lower prices and shorter time scales. One possible result of this tendency is lower quality of the output, as was demonstrated by the failure of a relatively high number of Iridium's in-orbit spacecraft.

At present, the dominant satellite manufacturers are in the US and Europe, though Japan has a satellite manufacturing sector that is trying to grow rapidly. The delay of Japan's manufacturing sector is the result of a piece of legislation passed by the US in the late 1980s, known as US Omnibus Super 301, which forced the country to open its satellite bidding process to outside competition.

Initially, all of Japan's satellite contracts were awarded to US companies, with Japanese suppliers such as NEC, Mitsubishi and Toshiba left to focus on supplying sub-systems to the successful bidders. All this hindered the full, independent development of Japan's manufacturing industry, though it led to strong links with the US industry. In fact, although still independent of one another and competing for NASDA business, Japanese suppliers are largely cooperating in partnerships with US prime contractors. Mitsubishi is involved in a new working relationship with Lockheed Martin and is focusing on LEO systems. Currently, Toshiba is cooperating closely with Space Systems/ Loral (SS/L) and aims to be a systems integrator, while NEC is looking to take a share of the Asian satellite market and concentrating on satellites for LEO/Medium Earth Orbit (MEO) systems.

However, while manufacturers from Japan have formed a series of alliances with their US counterparts, the country's satellite operators still retain their independence. Japan Satellite System (JSAT) and Space Communications Corporation (SCC) are wholly-owned by Japanese companies, with neither Hughes or SS/L holding any equity.

Consolidation: satellite manufacturing

Alliances in the satellite manufacturing sector are nothing new. In 1989, the satellite divisions of Matra and of Marconi Space came together to address the satellite and launch vehicle sub-system markets, thus forming Matra Marconi Space (MMS).

In the current surge of satellite activity, MMS has joined forces with Nortel to offer wideband satellite systems and has come together with DaimlerChrysler Aerospace (DASA) to form Astrium, a new European prime contractor. The French space

industry was restructured in 1988 by combining the satellite activities of Alcatel, Aerospatiale, Thompson-CSF and Cegelec into a single entity to create the third largest satellite company in the world, with Alcatel as the managing company. Currently, Alcatel boasts a product range covering commercial satellites, ground station systems and Research and Development (R&D) activities.

In recent years, Alcatel has been striking alliances to develop its activities as a satellite operator. In 1999, Alcatel and Loral Space and Communications created Europe*Star Ltd. The new company, which is integrated into the Loral Global Alliance has three shareholders: Alcatel, Loral and the Dr Schulte Hillen Group – which first had the idea of the alliance and reserved the three orbital positions at 43, 45 and 47.5 degrees East. The Loral Global Alliance is itself a grouping of Loral Skynet, Loral Orion and Satmex.

From its strategically-located orbital positions, Europe*Star will cover the five major growth markets of Europe, the Middle East, South Africa, India and Southeast Asia providing a wide range of video broadcast and telecommunications services. The system will be a one-stop-shop using Ku-band delivering Direct-To-Home (DTH) television, Internet access, rural telephony and high-speed data exchange.

Alcatel has also taken a stake in a Spanish company, Indra Espacio, an alliance that will add electronic flight communication sub-systems for satellites and aircraft into Alcatel's range of products.

Consolidation: equipment manufacturers

The market for satellite earth station equipment has been experiencing dramatic changes over the past few years. These changes are mainly due to a surge in the demand for Very Small Aperture Terminal (VSAT) systems - both in the small earth stations sector, which are now used both for small business applications and personal home use, and also new applications.

These applications require earth stations to move beyond the simple provision of voice, into voice, two-way data and video transmission. Furthermore, it is not just a matter of making earth stations smaller and cheaper: the Ka-band radiofrequency range is in the process of being opened up, bandwidth capability increased and Internet Protocol (IP) introduced.

Traditionally, earth station designs have been tied to the standards established by the Committee Consultif International des Radiocommunications (CCIR), to strictly control access to the satellite in terms of both transmission levels and radiofrequency spectrum. However, the current climate is far more complicated due to the rapid change in technology, the new protocols available and the increasing need for satellite systems to operate with IP, allowing seamless operation between satellite and terrestrial networks. All this means that the satellite industry as a whole is now increasingly accepting that earth stations need to move away from being application-specific to being able to work with those external standards that are more widely followed.

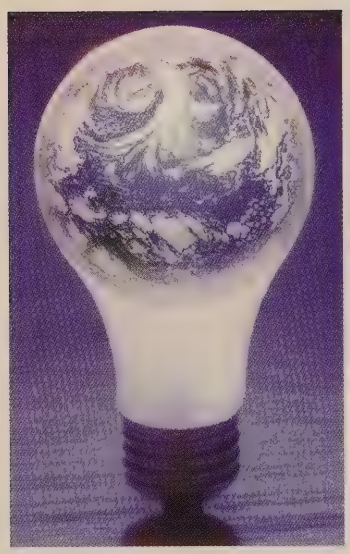
An equally important shift is taking place within those companies that provide ground segment equipment, where the process of mergers continues apace.

Image: PhotoDisc

In general, what is happening is the reverse of the 'core business philosophy', where companies focused on specific technologies such as antennas, amplifiers and Low Noise Receivers (LNRs). Companies are now aiming to become one-stop-shops that can provide a total package by using their different departments. This not only makes the overall system design easier, but it also makes it easier for the customer to procure the equipment, since the installation can be carried out by a single, integrated team and after-sales service queries can be directed to a single company. Companies such as NEC in Japan have always worked this way and this has been a major reason for their dominance in large earth station provision. In the US there has always been a wide variety of system and sub-system choice, though some companies such as Scientific Atlanta and Hughes offer total turnkey projects.

A number of companies are expanding their operations by acquiring other players in the marketplace. The process of expansion by acquisition not only gives a better market offering but also opens up the size of the market that can be addressed by the company. Radyne, for instance, acquired Comstream Holdings from Spar Aerospace of Canada. This move not only broadened the range of modem products offered by Radyne from 10Mbit/s to a maximum of 155Mbit/s, but also opened up China, Singapore, Indonesia and Europe to the company's products.

Another company that has been very active growing by acquisition is L-3 Communications that have taken over Aydin, STS (a division of California Microwave), Essco and Storm. However, the most spectacular example of this process is represented by Gilat, an Israel-based company. Through superb design of VSAT products, acquisition and cooperation with other companies, Gilat has become the dominant player in the global VSAT marketplace. In 1997, Gilat took over Skydata Inc, a Florida-based VSAT company specialising in paging and data broadcast markets. This move not only gave Gilat



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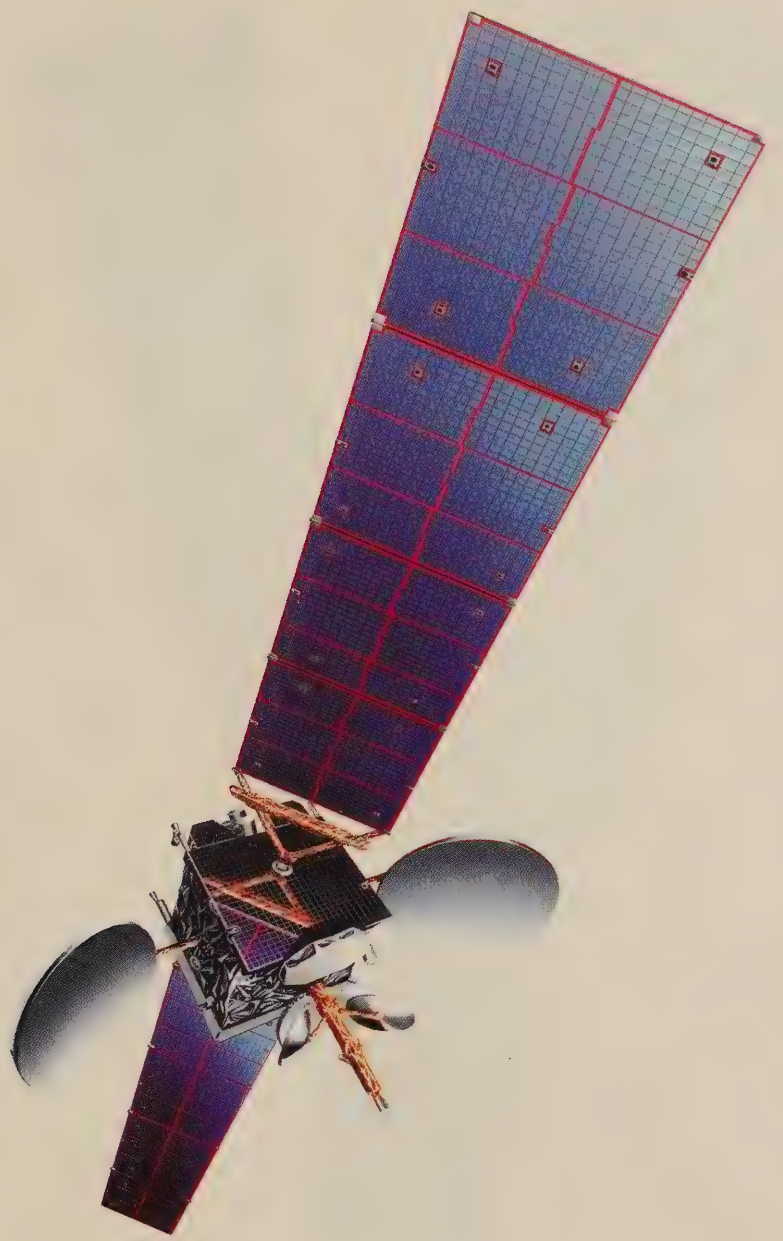

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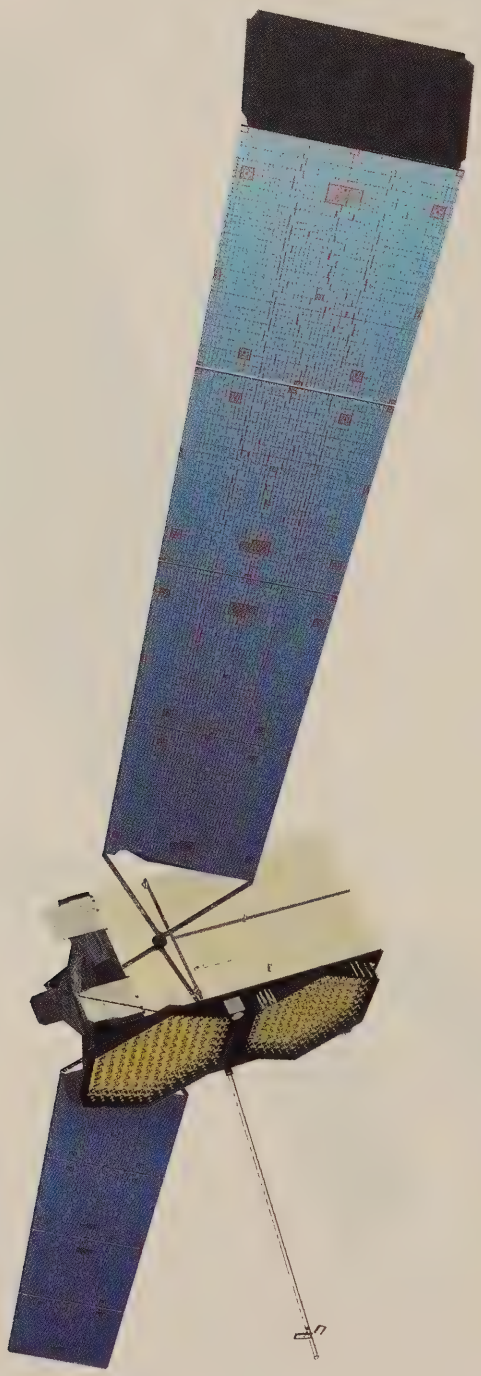

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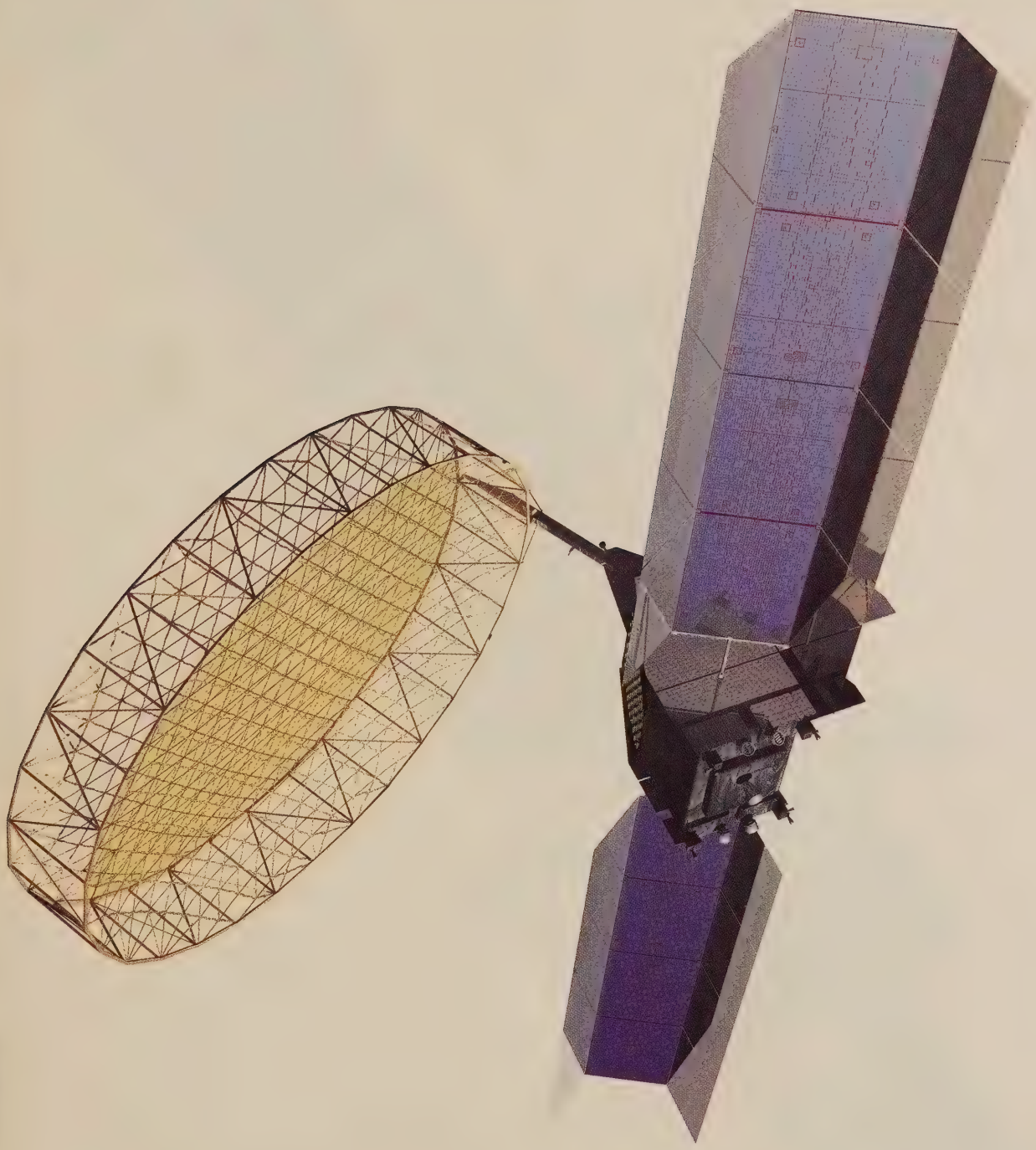

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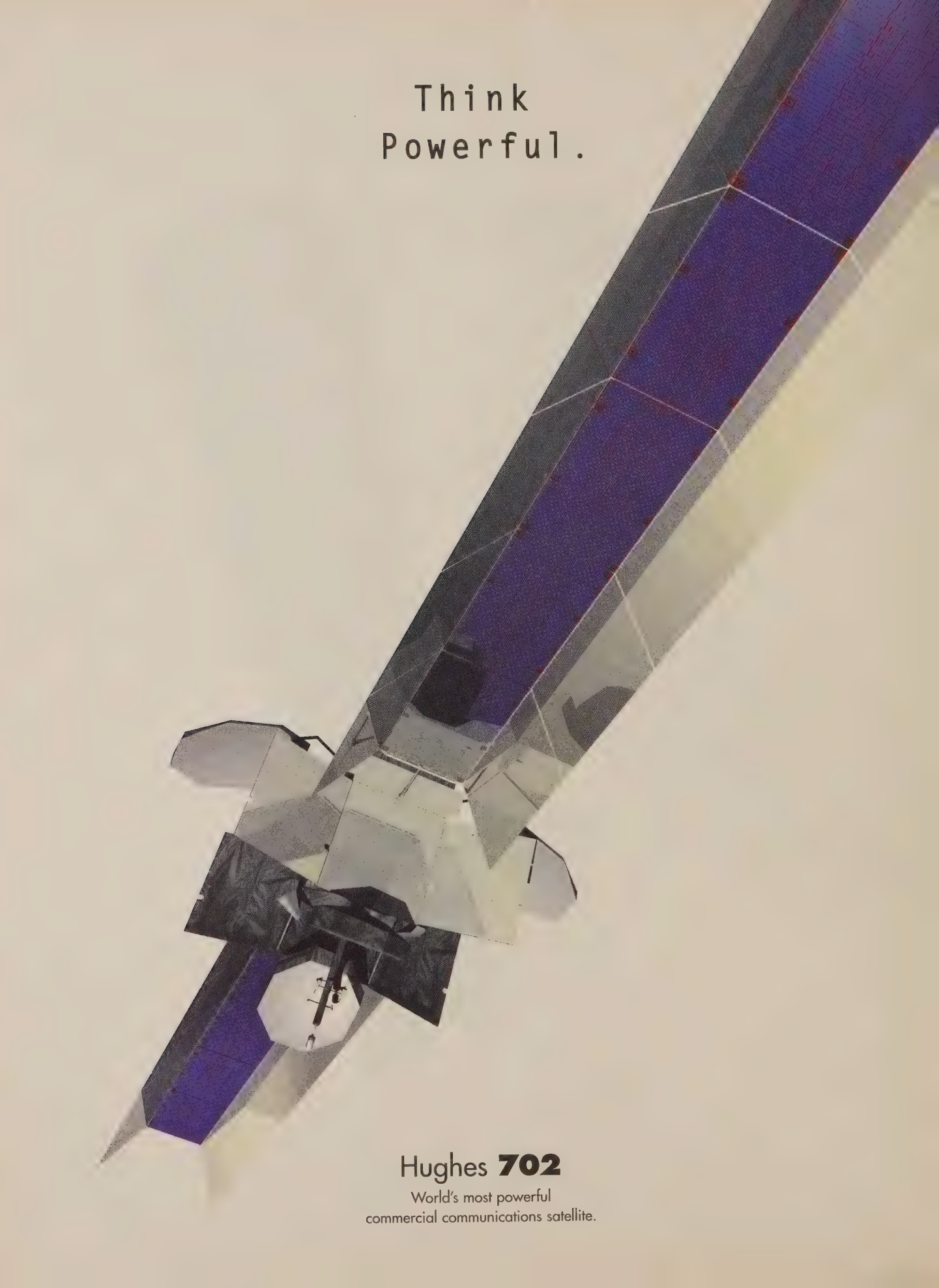
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access to new technology, but also opened up the US market to the company. Skydata itself had been formed in 1989 with a buyout of Harris' satellite division by its employees. Since Matra Marconi and Samsung were Harris' shareholders, they became automatically Gilat's shareholders when this took over Skydata.

In 1998, Gilat formally took control of Spacenet, whom they had been involved with since signing an agreement with GE Americom to cooperate in the VSAT business. Furthermore, Gilat took a stake in a Dutch company called Global Rural Village (GVT), which specialised in satellite-based rural telephony systems, and in Keppel, a Singapore-based company, in order to access a number of joint ventures addressing the Chinese market.

Additionally, Gilat initiated a joint sale and marketing programme with TIBCO Software Inc, a leading company in the field of enterprise middleware and applications integration. The deal adds publish/subscriber technology to Gilat's VSAT technology, which already supports real-time video and Internet access, thanks to TIBCO Software's multicast, message-oriented middleware support that opened up knowledge management and the corporate training markets to Gilat.

One of the latest investments into Gilat is from software behemoth Microsoft of the US, which is looking to offer a high-speed, two-way Internet service via satellite over the Microsoft Network. The company invested $50 million into Gilat. As a result of all these moves, Gilat is now the market leader in the VSAT business ahead of Hughes of the US, who was dominant for a long time.

Consolidation: Mobile Satellite Service (MSS) operators

Although at one time it looked as though the world would be swamped with non-geostationary systems, the failure of the Iridium system has meant that the wave of consolidation has reached Mobile Satellite Service (MSS) operators.

Although not a good way to rationalise an industry, this process began on Friday, 13 August 1999, when Iridium declared itself bankrupt. ICO Global Communications, who had their 12 satellite MEO system partially completed and was running short of cash, was so hit by the announcement that within two weeks they too went into bankruptcy, leaving Globalstar to fly the MSS flag.

So what went wrong? Firstly, Iridium positioned itself in the wrong segment of the mobile market. In fact, being simply a voice service provider is not enough unless you are actually focusing on countries with little fixed infrastructure and offer low-cost airtime tariffs and handsets - even terrestrial mobile operators did not get real growth until they got their package and pricing strategy correct. In essence, the failure of Iridium showed that people are only prepared to accept satellite handheld telephony if monthly charges are not involved, they pay as they go for calls and the price is not too far off terrestrial rates. In addition, the fact that the terrestrial mobile marketplace is already moving towards the provision of high-speed data and voice services has to be taken into consideration. Secondly, Iridium was far too optimistic about the market, grossly overrating its size. Thirdly, the handset was too expensive, although interestingly size was not perceived to be a problem as we know from the Kosovo conflict, where Iridium terminals were used and complaints were about the reliability of the service rather than the handsets' size.

Iridium tried to merge with ICO or Globalstar, but this was impossible due to technical incompatibility. The company then decided to let their 66 satellites fall out of orbit and burn up, but subsequently opted to leave them in orbit in the hope of being able to find a buyer. At the time of going to press, a New York-based investment company is waiting for the courts to decide on whether to accept their offer of $50 million for a system costing $5 billion!

At the same time, ICO is now out of bankruptcy following a $1.2 billion investment by Craig McCaw and Subash Chandra and other backers. The company has been renamed ICO-Teledesic Global Ltd. The $1.2 billion finance will allow the completion of the ICO network and cover the cost of launching the service. During the system's protected phase in bankruptcy, the designers of the ICO system have worked to extend the service offering. In fact, ICO Teledesic will offer voice services, as originally planned, but also a new family of services which are the equivalent of Third Generation (3G) terrestrial wireless offerings plus high-speed Internet services. These new offerings have been achieved by modifying the ground system making it flexible enough to support future changes on the 3G specifications.

Conclusion

There is no sign of any slowing down in the number of mergers taking place in the satellite industry. Indeed, this is likely to increase as manufacturers become more involved with satellite systems operators and the boundaries between communication systems become blurred.

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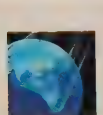

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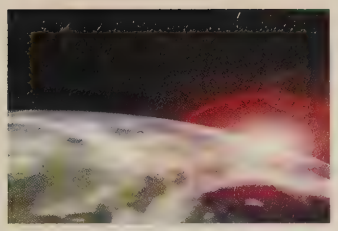

Images courtesy of PhotoDisc

Mark Williamson, independent space technology consultant and technical author, reviews the most significant developments in the space industry at the turn of the new century.

THE SPACE INDUSTRY, comprising satellite manufacturers, launch providers and satellite operators, is a peculiar animal. It grew from a long-established aircraft industry in response to the 'race for space' of the late 1950s, when most of the world's major aerospace companies formed specialised space divisions to produce rockets and/or satellites of various types. They instituted a civilian programme partly to share in the technological revolution of space development, and partly to detract from parallel developments in military technology which could not be publicised. Space was a convenient 'shop window' for their capabilities.

Now, after more than 40 years of evolution, the space industry has ostensibly become an industry in its own right, not simply an offshoot of a larger aerospace parent. In many cases, however, it is not truly commercial. The satellite manufacturing and launch industry, particularly in the US, is still tied to its aerospace parentage in that it relies to an extent on government contracts.

Nevertheless, the space industry operates very much in the real world. It is marketing its products and applications increasingly to the end-user, the purchaser of satellite TV or global positioning receivers. It is funding its projects in the mainstream financial markets and insuring its products against a widening variety of risks. This article looks at some of the main issues that have affected the space industry in the past year or so.

Satellite manufacturers

Satellite manufacturing has never been, and may never be, a highly profitable venture in the same sense that satellite service provision can be. There are many reasons for this, but among the most important are the short production runs and the huge amount of Research and Development (R&D) investment that accompanies most satellite projects.

The introduction of the satellite constellations promised to solve the first problem, and indeed could be said to have revolutionised satellite manufacturing, but the difficulties faced by the constellation systems in the past year have put a damper on hopes of production-line manufacturing and its consequent cost-efficiencies. As for R&D, satellite customers now seem happier than at any time in the past to accept new technology in their satellite systems, so satellite manufacturers are now obliged, even more than formerly, to invest in the development of key technologies simply to win a contract. For example, the last year or so has seen a boom in satellites with large deployable antennas and multiple spotbeam coverage, developments promised for the past two decades but dependent on finding a customer willing to take a risk with the technology.

Coupled with the increased complexity of satellite systems, manufacturers have also had to cope with the shorter production schedules demanded by customers. It seems that satellite customers are now either willing to accept the risks associated with asking people to do more, and more difficult, things in less time, and for less money. Something has to give, and it is usually reliability, as shown by the increase in satellite in-orbit failures in recent times.

The chief explanation for the decrease in the reliability of satellites has been a reduction in the time available for testing, one of the mainstays of the reliability assurance process. Manufacturers, not wishing to admit culpability, have argued that computerised test methods have reduced the time required to test a spacecraft and its components. This is true, but impatient customers can only be allowed to push the system so far, especially if they are also keen to demand the latest technological advances.

The introduction of the 66-satellite Iridium constellation was instructive. Since the spacecraft were ostensibly simpler than their larger geostationary cousins, and were built on an almost mass-production basis, it was understood that test standards would be less rigorous. Thus, as an integral part of the installation plan, it was recognised that satellites would fail in orbit and have to be replaced on a fairly regular basis. This necessity was proved by the large number of satellite or subsystem failures in the early deployment phase, when at least seven satellites were reported to have failed. Detailed information was, however, difficult

to come by. This was partly because Iridium wished its constellation to be viewed as an 'inherently-redundant system', rather than a group of 'individual prone-to-failure satellites', but it was also probably a reflection of the financial community's faltering confidence in the system. Less news was usually better news!

Indeed, satellite financing was another challenge faced by the satellite community at the close of the twentieth century. It was almost as if satellites had formerly been purchased with trading stamps or under the barter system; suddenly someone mentioned money and the satellite financing industry was born! Where once the pages of satellite magazines had been unsullied by stock reports and speculation as to corporate worth, readers are now bombarded with a new set of acronyms from IPO to EBITDA - if you have to ask, consider yourself spared!*

The impact of this development for satellite manufacturers, and of course owners and operators, has been significant. Not only are they answerable to a new set of masters; their financial affairs, in the case of 'quoted companies', are in the public domain. It is now far more difficult for Managing Directors (MDs) and Chief Executive Officers (CEOs) to hide behind their public relations executives and consider their recovery from an unfortunate business decision. Their problems are headline news.

Major news stories of the past year, among the satellite community, have included the bankruptcy and eventual demise of the Iridium constellation, and the parallel bankruptcy proceedings and apparent recovery of the ICO system. Most of the copy concerned, not the performance of the technology, but the performance of their shares and the dwindling confidence of the financial markets. What became known as the 'Iridium Effect' was initially a journalistic device to summarise the apparent jinx on satellite constellations triggered by Iridium's fall from grace. Later, however, it became an almost self-fulfilling prophecy. Financiers began to tar all satellite projects with the same brush: "If a satellite is involved it must be risky - remember Iridium?"

The third constellation for mobile telephony, Globalstar, is currently suffering from this type of scrutiny and micromanagement, and few consider its future secure. Indeed, were it not for the high profile backing of the Loral organisation and its CEO, Bernard Schwartz, it is unlikely that Globalstar would have survived until now. Nevertheless, in an ideal world, it would be between Globalstar and its customers to decide its success or otherwise, not speculators on Wall Street.

At the risk of making this a lament for satellite manufacturers, it should be pointed out that they have also suffered the recent financial crisis in the Asia-Pacific region, which led to the cancellation of a number of satellite contracts. Although the past year has seen an improvement in the region, nobody can predict how far this will go. Certainly there is a need for satellite communications throughout the region, mainly because of the lack of terrestrial infrastructure, but manufacturers would be unwise to bank on another Asian satellite boom. A model of sure but steady development would be a safer bet.

The region was also newsworthy in 1999 because of the export issue, some would say fiasco, in the US - namely the aftermath of the transfer of satellite export jurisdiction from the Commerce Department to the Department of State. In a nutshell, this placed US satellites, their component parts and the majority of documentation pertaining to US satellite systems on the armaments list. Since then, prospective purchasers of US satellites have found it difficult to find out what they are buying, European satellite builders have found it hard to obtain components, and insurers have been frustrated by an embargo on information required to assess risk.

The new regime sprang from a fear that foreign powers, specifically China, would learn how to enhance their ballistic missiles from imported US commercial technology. In the meantime, the State Department has accused all three of the nation's leading satellite manufacturers of compromising national security, although none has been charged with a crime, let alone convicted. As a result, US satellite manufacturers are now so wary of releasing information that even requests for publicity photographs from UK journal-

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** IPO = initial public offering; EBITDA - earnings before interest, taxes, depreciation and amortisation.*

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More importantly, as a result of the new regime, leading US satellite manufacturer Hughes was forced last year to default on a $450m contract with Asia Pacific Mobile Telecommunications (APMT) and suffered contract penalties of $92m. At the same time, Space Systems/Loral (SS/L) was obliged to suspend work on Chinasat-8, while DASA of Germany notified its project managers that they should seek non-US suppliers wherever possible. In the meantime, Alenia Aerospazio of Italy won a contract to build the platform for Canada's Radarsat-2 spacecraft when the Canadian government ditched a potential US supplier. Although US government officials have agreed, in principle, to treat some of its 'allies', such as Canada and some European nations, as 'special cases', the story is set to continue.

Of course, the parochial attitude of the US government is, in general, good news for European satellite manufacturers, which have already gained contracts that otherwise would have gone to US manufacturers and seem likely to win more. The newly-formed Astrium, for example, has recently acquired contracts from three international satellite organisations: Inmarsat (for its fourth generation), the newly privatised INTELSAT (for its NI Alpha 1), and the INTELSAT spin-off, New Skies Satellites (for NSS-6).

The formation of Astrium, finalised in May after years of planning, negotiation and due diligence proceedings, is a significant development in itself. Its represents a major consolidation of the European space industry, bringing together the largest manufacturers of the UK, France and Germany - by merging the interests of Matra Marconi Space (MMS) and DASA. This leaves two European prime contractors - Astrium and Alcatel Space - to compete against Hughes (currently being acquired by Boeing), Lockheed Martin and SS/L of the US. Moreover, the consolidation of European industry in Astrium is expected to continue in the near term with the absorption of Alenia Aerospazio of Italy and CASA of Spain, thus forming a multinational mega-company to rival America's best.

From an ownership point of view, it is interesting to note that Astrium is not simply a satellite or space system prime contractor: it has shareholdings in many of the best-known European space companies, including 23.55 per cent of Spot Image and 12.78 per cent of Arianespace. It also owns, among others, 100 per cent of Auspace, Australia; 51 per cent of Eurockot, Germany; 50 per cent of Euraspace, Germany; 50 per cent of Crisa, Spain; and 12 per cent of Spacehab, USA.

The trend towards larger and larger companies has prompted several of Europe's smaller manufacturers to complain to the European Commission (EC) that this represents unfair competition. Astrium has claimed publicly, however, that it does not intend to dispense with their services by manufacturing subcomponents in-house. Either way, the difficulty of importing US-built components is bound to benefit European subcontractors.

Launch providers

US government policy has also had a significant effect on the space launch industry in the past year. Most importantly, its 'restriction of information policy' has hindered launch failure investigations, an issue of crucial importance to two international joint ventures involving US companies - International Launch Services (ILS) and Sea Launch. Both systems have suffered failures, of the Russian Proton and Ukrainian Zenit respectively, in the last year.

According to reports, at one point during the Sea Launch failure investigation, foreign nationals stationed at the company's Long Beach home port were denied access to their own technology. Ultimately, this type of 'communication

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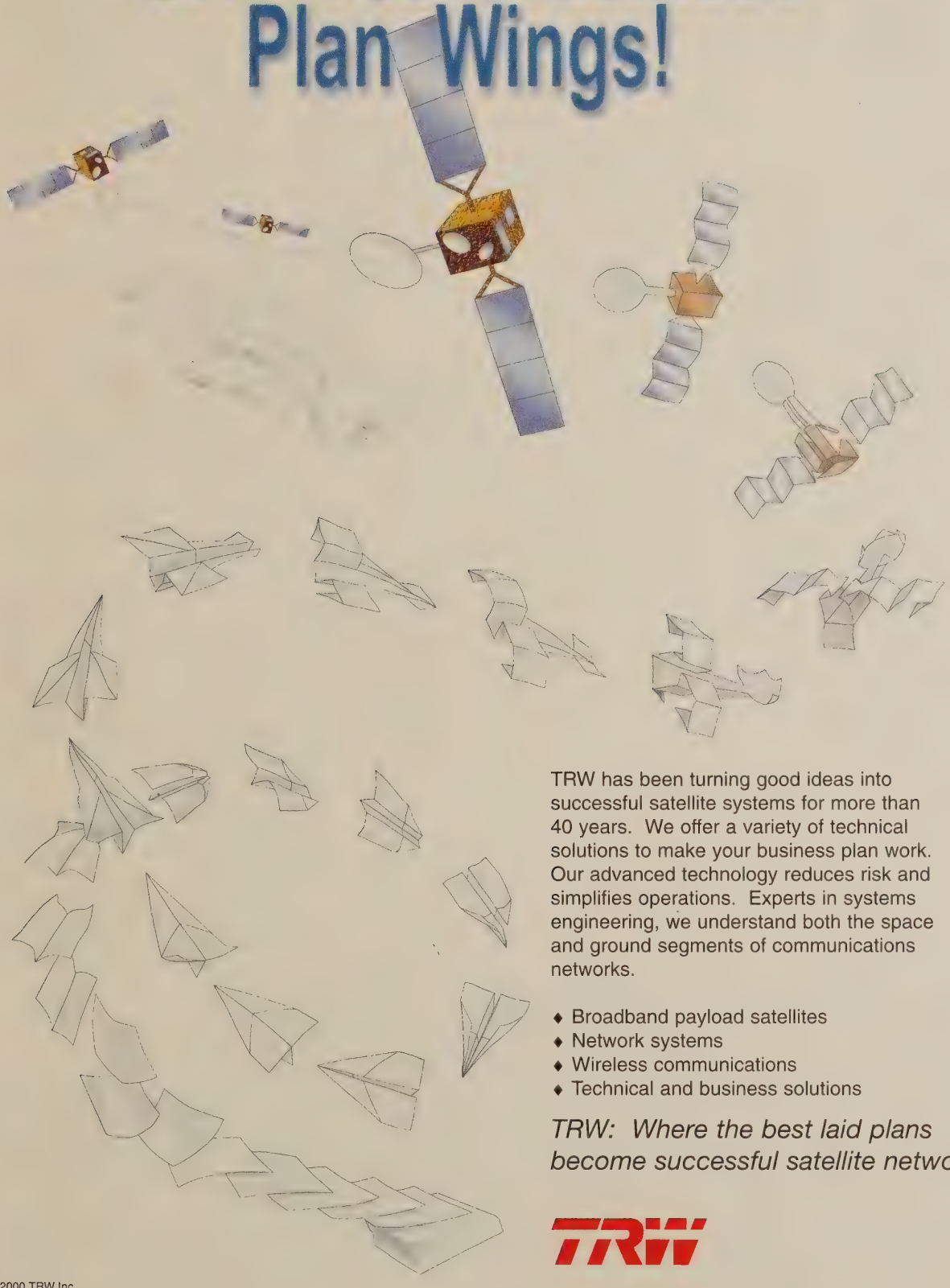

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breakdown' leads to technical failure, which leads to another investigation - and this is one vicious circle the launch industry cannot afford to get into. And if insurers cannot obtain the information they require, US operators will face the possibility of not being properly insured when something does go wrong.

US policy has also had a knock-on effect on China's commercial launch business. Now that operators know how difficult it will be to launch their satellites on Long March vehicles, they are tending to choose alternative launchers.

However, there is some positive news on the horizon in that the US seems likely not to renew its restrictions on the number of US-built satellites that can be launched on Eastern bloc launch vehicles - the so-called launch quota. Ostensibly a protectionist measure to safeguard the US launch industry against cheaper foreign launch services, the quotas were also a political device intended to discourage the proliferation of missile technology to 'unfriendly' Middle Eastern nations.

Apparently satisfied with Ukraine's efforts in this regard, President Clinton announced his intention in June to scrap the restrictions - that were due to expire in 2001 anyway. This has encouraged Russia that its restriction accord, which expires at the end of 2000, will not be renewed. It remains to be seen whether this, and a similar accord with China which runs to the end of 2001, will be rescinded entirely and, more importantly, whether it will make any difference to the respective nation's launch business. They will, after all, still have to run the gamut of State Department restrictions on satellite exports.

Although restricting Eastern bloc launches has probably assisted ILS's launch business, it has not removed the competition from Arianespace, the market leader in the commercial launch arena. The Atlas launch vehicle fleet has performed extremely well in recent months and years, reporting its fiftyfirst consecutive success in June, but it is still behind Arianespace. And now that Ariane-5 has progressed from its less-than-perfect demonstration flights to the commercial phase, marked (so far) by perfect launches of a science spacecraft and two commercial satellites, Atlas and the other contenders face even stiffer competition.

Had it not been for the late delivery of several spacecraft in 1999 and 2000, profits for Arianespace would have been even higher. The fact that Ariane has had nothing to launch for several months at a time is a firm indication that the satellite industry and launch services industry form a symbiotic relationship; one cannot exist without the other.

Technical problems, difficulties in raising finance and the cancellation of orders meant that fewer satellites than expected made it to the launch pad on time. This lack of continuity makes it difficult for launch providers to operate an efficient business and introduce cost-saving measures that they can pass on to their customers. On the other hand, when launch failures occur, the hiatus of several months in launch services makes it difficult for satellite manufacturers to meet their delivery-in-orbit contract schedules. Despite almost 40 years of experience in launching commercial satellites, it seems that matters are no more predictable now than they were in the mid-1960s.

Satellite operators

So where does all this leave the satellite owners and operators who rely on satellite manufacturers and launch providers to deliver their systems to orbit? It is a mixed record: some are laughing all the way to the bank, while others are left crying in their beer.

As far as the geostationary club is concerned, established operators such as Eutelsat and PanAmSat, have had a reasonable year. Eutelsat is establishing its third generation (W) series while, in parallel, developing its HotBird system for direct broadcasting. It launched its W4 and Siberian-European Satellite (SESAT) spacecraft within a month of each other earlier this year and plans to station its newly-ordered Atlantic Bird-1 satellite at its 'Atlantic Gate' position of 12.5 degrees West in 2001. Having launched two HotBirds in 1998, two further spacecraft are planned for 2001 and 2002. Meanwhile, having taking over the operation of the SBS and Galaxy satellite fleet, PanAmSat has plans to launch several additional PAS spacecraft in the next few years

In the Asia-Pacific region, the economic situation has made life less certain for the established operators, such as AsiaSat and APStar, but commentators familiar with the region are now beginning to sound more optimistic and 2000 could be a pivotal year. The need for satellite services in the region is likely to drive the development of satellite systems in the future.

Start-up ventures around the world have, in general, found life more difficult because of the reasons described, and those based in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) (Iridium, ICO, Globalstar and Orbcomm) seem to have had more problems than most. Where once proponents of LEO and MEO-based communications systems were ready to write off Geostationary Orbit (GEO) as 'yesterday's location', nobody with any knowledge of the issues now considers GEO systems outdated. The development of GEO-based mobile communications systems such as Asia Cellular Satellite (ACeS), Thuraya and Inmarsat, and mobile radio systems such as Sirius and XM Satellite Radio, seems to have proved the point. And the expansion of Internet services via satellite, almost exclusively from geostationary platforms, has further secured the future for the orbit.

The location of the satellites is not really the issue, of course; it is the services they provide which are important. Based on developments of the past year or so, it seems that satellite operators will be pushing two flavours of service in the near future: broadband multimedia and global positioning.

The rise of Internet and intranet usage and the need for wider bandwidths to handle the ensuing data rates has ensured the development of the Ka-band (20-30GHz) part of the spectrum, with higher frequency bands to follow. Existing satellite operators are specifying Ka-band transponders for their new satellites and a host of new Ka-band system operators are waiting in the wings, perfecting their system designs and attempting to raise financing. We have all heard the names: Teledesic, SkyBridge, CyberStar; now we await developments.

In the field of global positioning, as typified by the US-operated Global Positioning System (GPS) and the Russian-run Global Navigation Satellite System (Glonass), the future became clearer in the past year. Concerned about the continued availability of signals from the GPS, which is effectively a military satellite system, Europe proposed the development of a commercial system called Galileo. Details have yet to be confirmed, but it seems that the putative system has already had an effect, since, in May, President Clinton ordered the removal of accuracy restrictions known as selective availability. At a stroke this improved the accuracy of existing commercial GPS receivers by a factor of ten: instead of ascertaining their position to the nearest 100m, they can now do so to the nearest ten.

Inmarsat-3 spacecraft have carried global positioning enhancement payloads for several years, and the forthcoming I-4 satellites will continue the service. If satellite positioning becomes accepted for airline navigation, as satellite proponents hope, the stage will be further set for commercial operators to expand their remit from satellite communications to global positioning, most probably integrated into the same handset.

Non-one would deny that it has been a challenging and often difficult year for the space industry, but most would also recognise that it made the transition into the twentyfirst century with high hopes for the future.

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Global satellite operators such as INTELSAT, PanAmSat and Loral Cyberstar have begun to offer enhanced services at the 'edge' of the Internet. As the 'core' of the Internet network, which resides in the US, becomes increasingly congested, the Internet Service Provider (ISP) and content provider markets are increasingly being targeted for Caching, Streaming and Multicasting (CSM) services. Jose del Rosario, Strategic Analyst and Programme Leader of Satellite Communications at Frost & Sullivan, investigates.

IN THE PAST, the problem of the Internet was at the 'edge' of the Internet, the so-called 'last-mile', while the network 'core' was reliable and robust. However, since Digital Subscriber Line (DSL), cable modems and satellite terminals have solved the problem of slow access speeds in the last mile, now it is in the core that problems are taking place. Consequently, a market for satellite services to deliver content to the edge of the network is emerging, so that congestion at the core of the network can be bypassed.

Companies that participate in the new economy are increasingly using multimedia and graphic content to improve customers' website experience. In addition, media and entertainment firms are increasingly using the Internet as a medium for broadcasting events to a worldwide audience. These trends have contributed to the rise in congestion on the Internet and have resulted in the development of innovative content delivery services.

Satellites are well positioned to tap the Caching, Streaming and Multicasting (CSM) services market, although a growing number of players other than satellite operators are currently looking at this emerging market. A large number of these companies are new entrants armed with advanced technology and are part of the dot.com world rather than traditional satellite, broadcast or Post Telephone and Telegraph (PTT) organisations. Among them are: Akamai, Cidera (formerly Skycache), Digital Island, Edgix, The Fantastic Corporation, Internet SkyWay, ISP-Sat, Loral Cyberstar, Worldcast Newsfeed, InterPacket, NetSat Express, OrbLynx, Planet Connect, Satellite News Services, SatinNet BusinessNet, SkyPoP, SkyServ, TeleGlobe, Telemann, Unisource, and WAVO (formerly Wavephore).

The growing market for Internet via satellite

Internet traffic has accounted for a growing portion of operator revenues in recent years and is expected to grow in importance over time. As Internet usage grows worldwide, satellite-based traffic for CSM should account for a larger share of leased capacity as well as revenues.

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CIRCLE 9 FOR FURTHER INFORMATION

The Internet trunking market has accounted for a growing share of satellite operator revenues since 1995. However, this market is increasingly being threatened by high-capacity cable systems, such as Project Oxygen, which offer higher quality and capacity, specifically targeted for international Internet traffic. For the immediate future and well into the first half of this century, satellite trunking should continue to be a stable market, albeit growing at less stellar rates on an annualised basis. Indeed, Sir Arthur C Clarke, author, visionary and the first proponent of satellite technology, predicted in 1998 that commercial communications satellites will be replaced by submarine cables and other terrestrially-based technologies in 50 years.

In the broadband access market, products such as Hughes Network Systems' DirecPC and Gilat's SkyBlaster account for about three per cent of the installed base when compared to cable modems and DSL platforms. Satellite access platforms are expected to continue to be a niche solution in the next several years.

As the traditional mainstay of the satellite business becomes increasingly under threat from cable systems, and as the access market renders the satellite platform as a niche solution, CSM services present new opportunities for satellites to tap. In April 1999, INTELSAT announced the implementation of the Internet Distribution System (IDS), designed to cache the most frequently accessed Internet content in a data 'warehouse' and multicast the data via satellite to correspondent 'kiosk' sites around the world. By locally hosting popular content at these kiosk sites, the system aims to provide faster access time to Internet sites for end users, reduced international link costs for Internet Service Provider (ISPs), and reduced traffic load on original Internet sites.

Tom Eaton, INTELSAT's Director of Sales and Marketing, said: "The Internet has been our fastest growing service ever. The IDS service will become a key element in INTELSAT's Internet portfolio and will keep our goal of making the World Wide Web (WWW) truly worldwide." Indeed, Internet-related business accounted for 15 per cent of INTELSAT's revenues for 1999.

The long-term market potential as viewed by the financial markets also provides the right incentives for companies that are looking to play in the Internet space to tap these new services. Akamai, with sales revenues of US$4 million in 1999, enjoyed a $22 billion market capitalisation, while PanAmSat, with $810 million in sales revenues, enjoyed a market capitalisation of only $8 billion.

Terrestrial competition in the US

The US market is highly important for two reasons. Firstly, the Internet backbone as well as 80 to 90 per cent of all content resides here, such that over 90 per cent of content worldwide physically passes through or needs to be downloaded and uploaded in the US. The problem of core congestion is therefore largely a US-based phenomenon and will remain so for at least four to five years. By this time, mirror sites will have been adequately established in other regions, and these regions will develop their own content that resides within their respective borders. Secondly, the number of broadband-based Internet users and content providers that use video and graphics-heavy files, are also expected to reside largely in the US, which further exacerbates the core congestion problem. The edge caching market, in order to address the Internet core congestion problem, is thus a highly US-centric or US-based market in the near term.

In the US, terrestrial-based competition may nullify the advantages presented by satellite-based delivery. Digital Island and SightPath, among others, are offering caching and content delivery either to the edge of the network or to enterprise customers directly using terrestrial platforms. Akamai is currently using both terrestrial and satellite platforms, using the former for US-based caching and the latter predominantly for international delivery.

In addition, companies like Global Crossing and Qwest are laying the infrastructure for interactive services. Companies such as Akamai are building tools and services around the interactive capability that is constantly improving in the wired infrastructure. It is true that today the Internet is becoming congested at the core and a business case does exist for solving the problem. So the issue is, how do you fix it? Edge caching is one way to address the problem. Within this solution, satellite delivery to the edge is an option, a proposition being championed by iBEAM, Cidera, and InterPacket among others. Another solution is to intelligently move content around the edges of the Internet while retaining the full interactivity of the Internet itself. This solution is being developed by Akamai for the US market through software integration.

Today, satellite-based, edge-caching solutions are more suitable for delivering dynamic and live media, while terrestrial services are more efficient and cost-effective for delivering static content. The classic example is the launch of the 'Victoria's Secret' site last year where the number of hits could not be accommodated by the site's server and the Internet itself. The satellite solution would have solved the congestion and the number of hits would have been accommodated. However, it is still unclear whether Victoria's Secret-type of events can be considered as a 'killer application' or whether the event was a historical aberration, such that the market for live broadcasts may be few and far between.

In addition, with the premise that the Internet infrastructure will continuously improve through the efforts of Global Crossing, Qwest and others, the Akamai-type terrestrial-based solution is likely to be preferred over the long-term due to cost savings. The implication is that the satellite edge solution will become an interim and/or limited one for the delivery of both static content and live events for developed country markets, particularly for the US.

However, international markets where satellites are competitive are not expected to lose ground to terrestrial-based platforms, since the world is still

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very much unwired and is likely to remain so for a considerable period of time. The implication is that satellite edge-caching solutions are not interim solutions for international ISPs and content providers.

Emerging markets: a long-term proposition

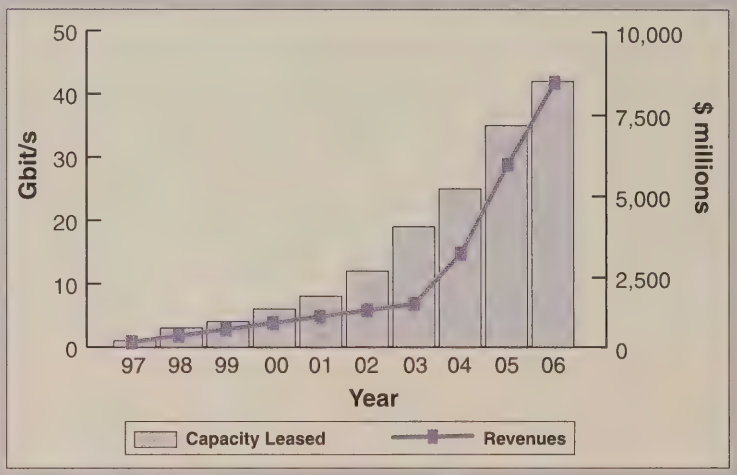
According to the Computer Industry Association, the number of Internet users worldwide is expected to grow from 319 million in 2000 to 717 million by 2005. The US is expected to account for 200 million users by 2005, while the other 517 million users will reside in the rest of the world. Approximately ten per cent, or 71.7 million users worldwide, are likely to be broadband-based subscribers using DSL, cable modems and other platforms, adding further strain to the core of the network. As Internet content grows increasingly bandwidth-intense internationally, there will be a trend toward broadcasting content to regional edge servers where it can be served locally.

Since the Internet backbone resides in the US, as mentioned previously, emerging markets, as well as the ISPs and even the carriers that serve those markets, are by definition at the edge of the network. The basic argument for international markets is that, since the backbone is in the US, international locations are left with two options to access the core: fibre or satellites. Where fibre prevails, satellites are likely to lose out due to cost structures. Where fibre does not prevail, satellites are a natural solution. Streaming media is also growing rapidly on the Internet, and satellite distribution is the ideal means of delivery from both a technological and economical viewpoint.

Satellite-based CSM service providers, as well as companies offering hybrid solutions, are currently negotiating agreements and building partnerships that put them in a position to tap international markets when they explode.

Global bandwidth capacity & revenue forecasts

Source: Frost & Sullivan

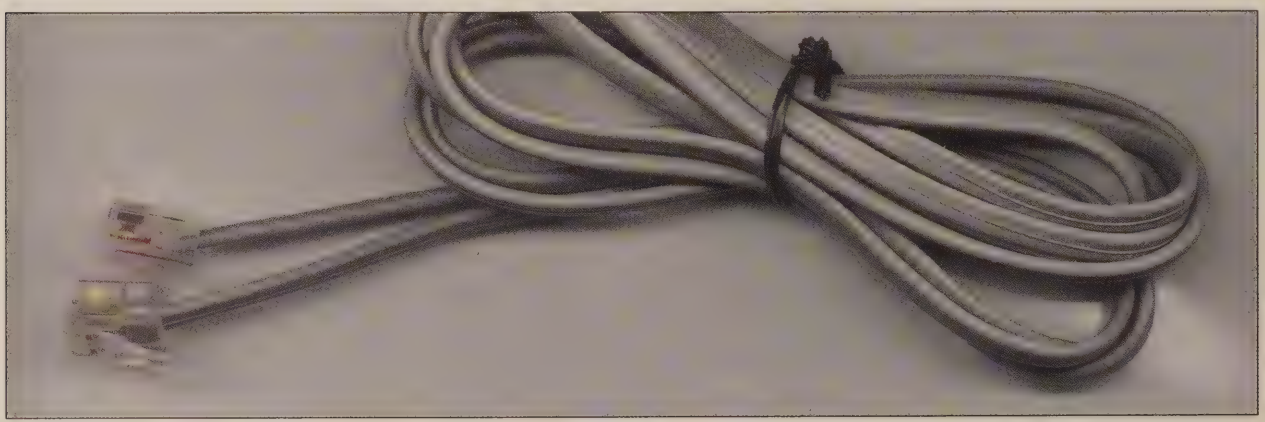


Akamai and Cyberstar announced an agreement to work together in late 1999, and in April 2000 delivered a demonstration during the National Association of Broadcasters (NAB) conference, for a hybrid satellite and terrestrial delivery network to ensure high performance for streaming media. Sonic Foundry, a developer of digital media and Internet software tools, services, and systems provided by encoding, was also involved in the NAB demonstration. The cooperation aims to provide delivery of video streams seamlessly from satellite to terrestrial networks with real-time precision and performance monitoring.

Streams are sent across the Akamai network by dynamically determining the optimal route using any combination of both (or either) the terrestrial Internet and the Cyberstar satellites. Akamai's SteadyStream technology can enable any number of satellites to be used simultaneously. Akamai's John Tenore said: "Satellites are being used in remote locations where terrestrial-based platforms are difficult, if not impossible to deploy. International locations are also markets that are likely to use satellite-based platforms in overall content delivery. In the near term, Cyberstar satellites are expected to route traffic within and outside the US, specifically for live broadcast events. In the long run, Cyberstar is expected to increasingly route traffic for international connections."

In February 2000, InterPacket announced a partnership with iBEAM to deliver streaming content to edge servers and regional data centres around the world. In turn, InterPacket will give iBEAM access to multiple teleports and satellite transportation to deliver streams to major international centres. InterPacket will provide points-of-presence, installation, uplink, transport and network monitoring services to iBEAM in Europe, the Asia-Pacific region, Latin America, the Middle East and Africa.

Digital Island announced in May 2000 an agreement with Cidera to expand its Footprint content delivery net-



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Larry J. Boisvert, Telesat Canada
Romain Bausch, SES/Astra
Robert W. Ross, New Skies Satellites
Giuliano Berretta, Eutelsat
R. Douglas Kahn, PanAmSat (invited)

Broadband Satellite Systems : Pipe Dreams no More

Margarita Dilley, Astrolink International
Dr. Thomas Glynn, NetSat 28
Leonhard J. Stärk, Eutelsat
Gérard Dosogne, SkyBridge
Robert Feierbach, SES/Astra
Edward Fitzpatrick, Hughes Spaceway
David Drucker, iSKY

Financing and Investing in Satellite Operators & Service Providers

Stephen C. Leonard, International Space Brokers
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Satellite as an Internet Platform

Mohsen Sanai, Shownet Internet Solutions
Amiram Levinberg, Gilat Satellite Networks
Marni Ehrlich, Netsat Express
Candace Johnson, Europe on Line
Doug Humphrey, Cidera
Joseph L. Amor III, Microspace Communications
Michael B. Kulinski, Titan Wireless

Mobile Satellite Systems : Time to Make Money

Michael Storey, Inmarsat
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Satellite Manufacturers after the Restructurings

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work with Cidera's satellite broadcast services. Currently, Digital Island has strategically deployed data centres in the US, Europe and the Asia-Pacific region, which are directly connected to access service providers in 25 countries and its network of more than 1,200 content distributors across the Internet. This network is expected to grow to more than 6,000 content distributors in 350 locations worldwide by 2003, and satellites are expected to play an increasing role in the planned rollout.

Other companies are entering the market as well. OrbLynx Inc uses strategically located remote warehouses, which act as caching depositories around the globe. Using INTELSAT transponders, the company plans to deploy 500 'kiosks' and ten warehouses in regional locations by the end of 2000, consuming about three to four C-band transponders.

Traditional operators VS dot.coms

In the near future, satellite operators, which can be considered as old economy companies, are expected to compete head-on with new economy companies for the CSM market. Instead of playing exclusively in the wholesale side of the CSM business, where transponders are leased to retailers such as InterPacket and iBEAM, traditional operators like INTELSAT and PanAmSat are establishing their own Internet businesses that directly taps the customer-base being targeted currently by the new entrepreneurs.

INTELSAT and Cyberstar have launched their offerings, and PanAmSat has recently entered the market as well. In March 2000, PanAmSat unveiled its strategic initiative for the NET/36 Global Internet Broadcast Network. NET/36 has been initially allocated 24 Ku-band transponders and PanAmSat has begun a 1,000 satellite-enabled server deployment at last-mile high-speed Internet service providers on the edge of the Internet in the next 12 months. PanAmSat plans to invest up to $250 million in capital and operating expenses over the next two years to deploy NET/36.

NET/36 opens new markets to PanAmSat with its end-to-end service for high-speed video streaming over the Internet. Since NET/36 is a complementary overlay to the terrestrial Internet, it provides PanAmSat with a compelling service offering in areas where high-speed Internet access is available to consumers. This complements their traditional services for Internet backbone connectivity and data transfer, which are appealing in areas where infrastructure is lacking.

However, NET/36 will overlap with software companies whose services speed narrowband website content delivery, as firms upgrade their networks to accommodate the requirements for broadband streaming over the Internet. According to PanAmSat, this includes companies such as Akamai and Digital Island. Chris Sheik, Product Manager for Net/36 said: "NET/36 is a premium service offered to content providers for whom a high-fidelity video stream is essential. Akamai and Digital Island have services designed to speed the delivery of static narrowband Http content like text and still images. We believe that with the exponential growth of high-speed Internet access to households, high-fidelity video will become the driving force for Web content, and PanAmSat is well positioned to capitalise on this trend."

The financial markets seem to be listening. The market turbulence of recent months caused Akamai's market cap to fall to $7.2 billion, a 67.3 per cent loss based on its 52-week high. PanAmSat's market cap fell to $6 billion or a 25 per cent loss over its year high.

Conclusion

Traditional satellite operators are currently enjoying the entrepreneurial drive of new satellite-based entrants such as Digital Island, Edgix, iBEAM, InterPacket, and OrbLynx among others, in using satellites to deliver content to the edge of the Internet network. Edge caching, streaming and multicasting via C- and Ku-band (and eventually Ka-band) transponders are expected to account for a growing share of Internet via satellite revenues as accessing the core of the network becomes increasingly difficult, specifically in international and remote locations.

The satellite solution, which provides an immediate and relatively cost-effective platform to international ISPs and content providers, should continue to be a viable and increasingly important business for traditional satellite operators and the new breed of entrepreneurial companies to tap. Satellites are playing an important role in the development of the Next Generation Internet (NGI), which has caused traditional operators to re-examine and re-invent their business plans, in order to serve as well as compete with the new breed of companies that are actively building NGI.

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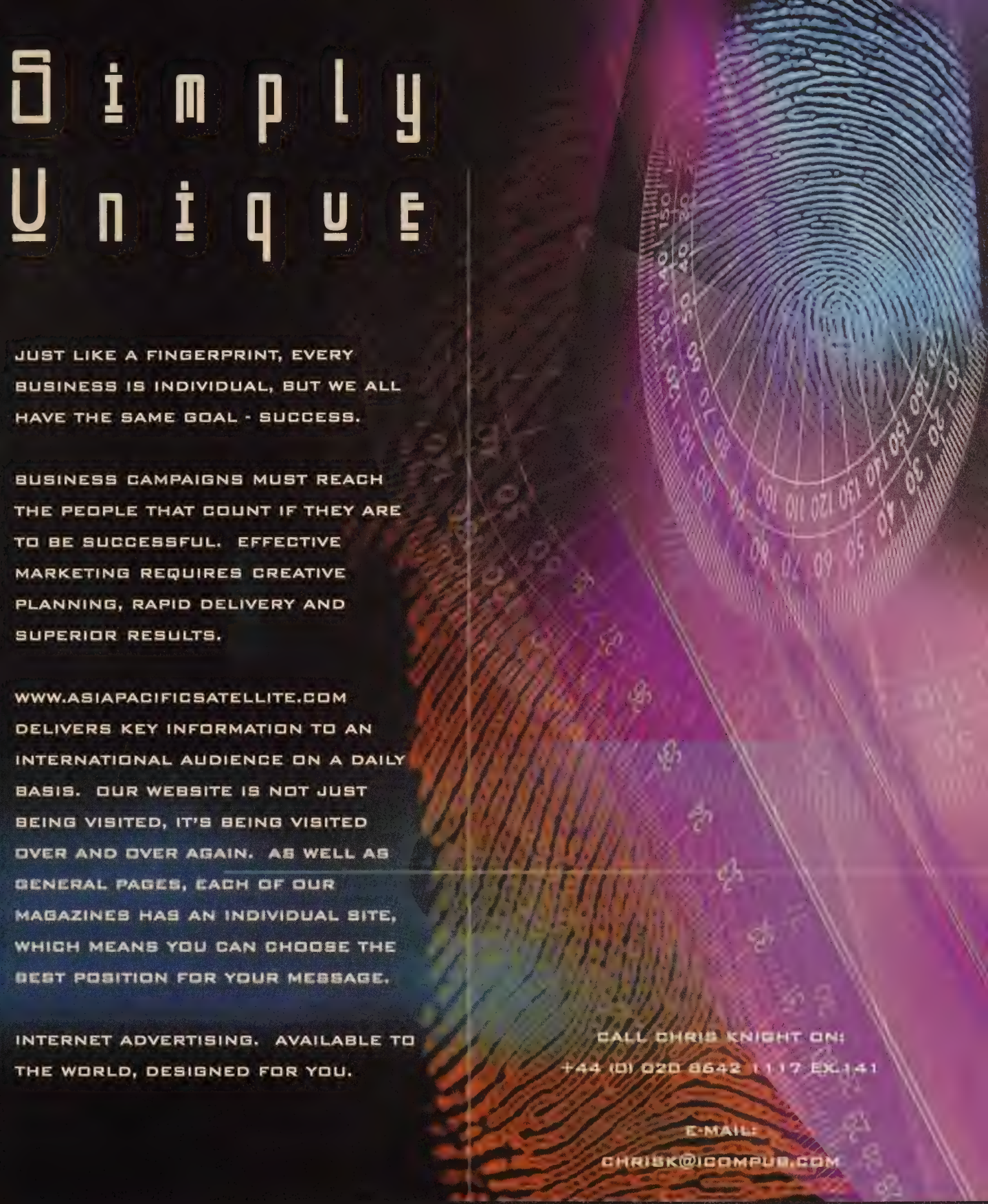

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Leading the edge

As the Internet is imposing itself as the new 'reality' for satellite communications, both regional and global operators are trying to enter this lucrative market. Among the well-established players in Southeast Asia, Thailand's Shin Satellite is leading the way into the new era. Giovanni Verlini, Editor of Asia-Pacific Satellite magazine, reports.

COMPLETING THE NINTH and final review of the Thai Programme, the Executive Board of the International Monetary Fund (IMF) has commended the country's authorities on the considerable achievements they have made under the IMF-supported scheme aimed at making Thailand a country with a financially-sound economy and institutions.

The IMF stated that: "The objectives of the programme have now been met to a considerable extent, as recovery is underway and an on-going reform strategy is in place to address weaknesses in the institutional framework and facilitate corporate debt and bank restructuring. Indeed, the recovery has turned out to be impressive: output growth this year is set once again to exceed four per cent, exports are growing rapidly, the balance of payments position remains strong, and inflation is well under control.

"Looking back over the last two and a half years under the IMF-supported programme, the Fund was impressed by the Thai's authorities' successful implementation of economic policies. The authorities have begun to put in place an ambitious reform agenda that is necessary to underpin continued strong economic performance over the medium term."

Currently, the Bank of Thailand forecasts that the economy will grow between four and five per cent in 2000, while government data show that unemployment is falling to 4.7 per cent from 5.2 per cent.

However, there is much for Thailand to return to pre-crises levels. The IMF says that over the medium term the challenge will be to sustain economic recovery in the context of a heavily indebted corporate sector and weakness in the country's financial system. But Thailand seems to be on the right path according to the IMF.

Meanwhile, the Asian Development Bank (ADB) has approved a US$25 million equity investment in the Thailand Small- and Medium-size Enterprises (SMEs) Investment and Restructuring Fund (SIRF). The fund, which has a target size of $100 million, will invest in SMEs with promising businesses that are in need of capital expansion. The SIRF is expected to help restore investors' confidence in Thailand. In addition to the fund investment, the ADB will make an equity investment in the Thailand Fund Management Company (TFMC), which will manage the fund.

In the meantime, the Thai Government is carrying out a comprehensive plan of privatisation for which it is advised by consultancy firm Arthur Andersen. According to the plan, all major sectors of the country's industry, including telecommunications, energy, oil and gas, transport, water and infrastructure, are in the process of being privatised. As to the telecommunications sector, although the Cabinet has approved the plan, the privatisation of the Communication Authority of Thailand (CAT) and Telephone Organisation of Thailand (TOT) has not been progressing due to unresolved issues with concessionaries.

The Internet

Thailand is one of the countries in Southeast Asia that are leading the way for the development of the Internet in the region. A number of companies, both public and private, are in the process of investing large sums of money and resources for the implementation of Internet-based projects, propelling Thailand into the twentyfirst century.

The Thai Government has plans to liberalise the telecommunications industry in October 2000, with data and Internet services expected to be first in the liberalisation process. In the meantime, two pieces of legislation aimed at the facilitation of Internet business and e-commerce are being put forward for the consideration of parliament. An e-commerce transaction bill would establish a legal framework for online trading and a digital signature bill would help ensure the security of online transactions. The absence of Internet-related laws is considered to be one of the main reasons for the relatively modest growth of e-business in Thailand, and the new bills are expected to create public confidence in doing business on the Internet.

Many analysts remain sceptical about the process of privatisation and deregulation in the country, as a bundle of old laws and regulations remains to be solved for the Thai market to become an environment conducive to the growth of private telecommunications operators. The so-called Telecoms Master Plan, a change of the basic laws that govern the ownership of telecommunications assets, and the preparation for the privatisation of both TOT and CAT, is still far from being finalised.

However, despite the regulatory restraints currently affecting the sector, the Internet continues to expand at an ever-increasing pace, requiring more capacity by the day. Many experts seem to believe that the demand for higher speeds of service can only be addressed with the deployment of entirely new satellite systems, and Shin Satellite seems to have taken this route. Currently, the Thailand-based satellite operator is planning to address the demand for such services with a new type of spacecraft.

A new satellite concept

Speaking at a press conference held at CommunicAsia2000, Dr Dumrong Kasemset, Chairman of Shin Satellite, said: "We did not design our current satellites for the Internet." In order to address this problem, Shin Satellite is planning to launch a new Ku-band satellite to be called iPSTAR to tap into the demand for Internet services in the Asia-Pacific region.

Scheduled for launch in 2002, iPSTAR will be targeted at the Direct-To-Home (DTH) broadband business. Dr Kasemset commented: "Our new broadband satellite will have more efficient modulation so you can get more bits per Hertz." Shin Satellite is currently in the process of selecting from two tender bids for the project, while the company expects to announce the winner during the year 2000. In the meantime, Shin Satellite has chosen Norwegian equipment supplier Nera to provide gateway technology for the iPSTAR system. The contract is estimated to be worth around $4.9 million. The iPSTAR satellite will provide low-cost, high-speed broadband Internet services throughout the Asia-Pacific region at download speeds of up to 10Mbit/s and upload speeds of up to 4Mbit/s.

Shin Satellite Executive Chairman Dr Dumrong Kasemset said: "This agreement will implement the first stage of the project from the ground-based perspective and will be an indicator of the expected success of the whole system."

Nera ASA's President and Chief Executive Officer (CEO), Bjørn Ove Skjeie said that Nera is very satisfied being a part of the iPSTAR project. "We strongly believe in satellite communications being an integral part of future broadband communications," he stated.

iPSTAR

Multimedia Internet applications have experienced exponential growth in recent years and are continuing to grow very rapidly. This huge bandwidth requirement has been encouraging massive deployment of broadband Internet solutions using various technology options - in particular to the portion of the network which connects to the end users, the so-called 'last mile' portion.

To serve this broadband Internet bandwidth requirement, Shin Satellite has been

Photo: Tourism Authority of Thailand

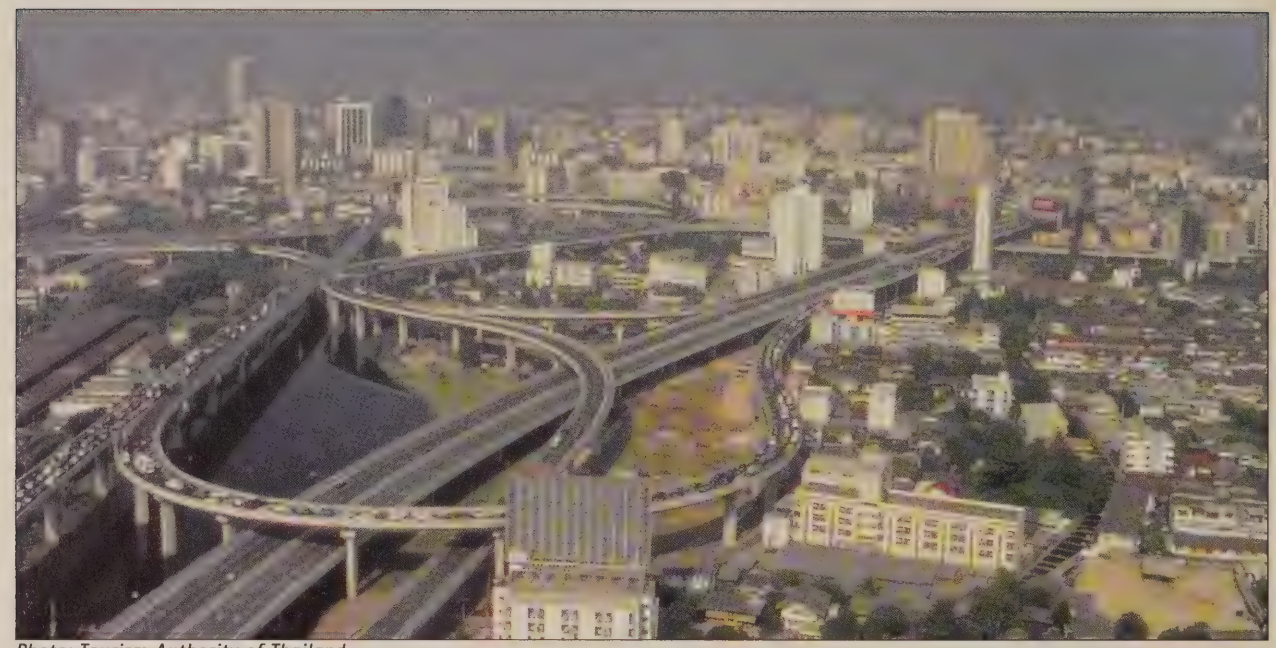

Photo: Tourism Authority of Thailand

developing a low-cost, high-capacity satellite system called iPSTAR broadband satellite system. iPSTAR will provide a revolutionary satellite-based 'last mile' broadband Internet services, serving all kinds of multimedia content, applications and services.

Shin Satellite's research and development partner has developed high efficiency digital coding and compression techniques, together with a unique and flexible system architecture. The iPSTAR broadband satellite system will deliver a nominal capacity of over 50Gbit/s. This capacity is equivalent to over 1,000 standard 36MHz transponders, a factor of 20-40 times more efficient than conventional satellite technology. This makes iPSTAR much more cost-efficient than existing and proposed satellites.

Due to the cost-effectiveness of iPSTAR, Shin Satellite expects to offer its services at much lower prices than competing technologies. This combination of a low-cost high-capacity satellite system together with a competitively low-cost user terminal available anywhere under iPSTAR's footprint will create a broad range of services at affordable price points. Importantly, iPSTAR employs several technologies and concepts that are technologically and financially practical, thus making it one of the most promising and viable. This allows iPSTAR to have the first mover advantages and meet the time-to-market requirement.

The system

Although iPSTAR-1 will utilise a revolutionary digital coding technique and system architecture, it will be based on technology already largely in existence. To support the simultaneous usage of millions of users throughout the Asia-Pacific region, iPSTAR-1 is designed to provide combination of multiple spot beams, shaped beams and wide beams for one-way and two-way communications and broadcasting purpose. The iPSTAR-1 satellite will provide telecommunications and multimedia services to households, business and private organisations. Considering the nature of iPSTAR's spot beams and ground system network, the most reasonable future services with the best optimised resource utilisation will be Asymmetric Internet Traffic (AIT).

In addition, there will be dedicated regional broadcast beams that will provide cost-effective, high-quality broadcast services to several regions within the coverage area. This dual use of the available spectrum for narrowcast services (Internet, data, or other two-way communications, ie, telephony, etc) and broadcast services on the same platform represents the highest efficiency and flexibility in service provision possible.

As opposed to the current conventional satellite business model, iPSTAR aims to serve directly to the mass market end users for the 'last mile' portion instead of the traditional telecom operators for long-distance transmission or broadcasters for large coverage broadcasting.

Shin Satellite's fleet

	Position	Transponders	Type	Launch Date	Lifespan	Launch Vehicle	Services
Thaicom-1A	120° East	10 C- 2 Ku-band	HS-376L	18.12.1993	15 years	Ariane-44L	FSS/BSS
Thaicom-2	78.5° East	10 C- 2 Ku-band	HS-376L	8.10.1994	15 years	Ariane-44L	FSS/BSS
Thaicom-3	78.5° East	24 C- 14 Ku-band	S.bus 3000	16.4.1997	14 years	Ariane-44LP	FSS/BSS
iPSTAR-1	120° East	Ku- & Ka-band	n/a	2002	n/a	n/a	FSS/BSS

Source: Asia-Pacific Satellite Yearbook 2000, Spacetrack.

ChinaSatellite 2000

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This is particularly suitable for Internet and rural telephony, where last mile always remains the major obstacle, and will help generate large upside revenue from retail services. There are many possible applications for iPSTAR. Each application can also be configured with different bandwidth ratio to suit the application requirements, as well as to suit the competitive products offering to the marketplace. The user terminal will be made available and applicable to current conventional satellite with about two to three times performance/bandwidth improvement and will be forward compatible with the iPSTAR satellite system. This provides initial and interim services ('soft launch') to take place and build towards the upcoming iPSTAR-1 satellite, and, again, allow iPSTAR to have the first mover advantages and meet the time-to-market requirement. The first generation user terminal is expected to be available in year 2000-2001.

System advantages

The iPSTAR broadband satellite system design offers great advantages in comparison to other proposed broadband systems, or with terrestrial-based competition:

- Capacity of 50Gbit/s - total capacity 35Gbit/s for two-way application and aggregate bandwidth of approximately 15Gbit/s for broadcast applications;
- Standard per Mbit/s price level for iPSTAR broadband satellite is expected to be less than one-third that of conventional satellite. Service Providers can pass this cost reduction on to end subscribers to increase their subscriber base while still enjoying huge upside of retail profitability and other value-added revenue potential;
- Bandwidth on demand;
- Low price, small user dishes (between 0.8 m and 1.2 m) at price less than $1,000 for transmission capability of up to 2Mbit/s and reception capability of up to 8Mbit/s per channel;
- Full services capability;
- High availability - aggregate greater than 99.8 per cent;
- Instant infrastructure; and
- Insensitivity to distance and remoteness.

The ability to keep up with the ever-changing needs and advancements of technology is crucial to a system's long-term success. The iPSTAR broadband satellite system is designed to be fully compatible with the formats of today, while also being updateable to benefit from future enhancements. This allows the system, with a given capacity at launch, to significantly increase that capacity by means of software routine upgrading that controls demodulation, detection and coding.

Services

The broadband system will provide telecommunications and multimedia services to households, business and public organisations. Individual households will have access to a wide variety of pay television and Video on Demand (VoD) services, low-cost Internet Protocol (IP) voice telephony, as well as high-speed Internet connections. Private and public organisations will access two-way high-speed corporate Internet plus Ultra Small Aperture Terminal (USAT) and Virtual Private Network (VPN) services in addition to the above services offered to consumers.

By using just one single set-top box and a small receiver dish, users will be able to take advantage of all the services mentioned above. Prices are estimated to be comparable to terrestrial broadband solutions such as ADSL, Cable Modem and LMDS. Furthermore, the service will take advantage of using geostationary satellite technology, providing flexible service locations and quick deployment.

The first generation technology will be rolled out in 2000 and 2001, while the second generation will support the further expansion of the terrestrial infrastructure as satellite coverage is extended further over Asia and Australia and the satellite capabilities are greatly enhanced. The iPSTAR system has the potential to be expanded into a global system by deploying additional satellites.

Shin Satellite: company profile

Shin Satellite Public Company Limited was founded in 1991 under a license from Thailand's Ministry of Transport and Communications to launch and operate Thailand's first communications satellite system. The company is a wholly owned subsidiary of Shin Corporations, the leading telecommunications, computer and broadcasting group of companies in Thailand.

Since its inception, Shin Satellite has run satellite platforms and service facilities in order to provide high quality satellite services. The satellite control centre, Thaicom Satellite Station, is located in a suburb province outside Bangkok called Nonthaburi. It houses more than one hundred engineering, operations and service personnel.

Shin Satellite Plc has also built a new state of the art uplink and broadcast facility called the Thaicom teleport and DTH centre, located in Pathumthani province North of Bangkok. This teleport centre can facilitate broadcast operation for hundreds of compressed digital TV channels for Thailand and other countries.

The centre has been in service since mid 1997 serving users in Thailand, India, the Philippines and Vietnam. It enables Shin Satellite to provide complete turnkey services for the expanding satellite communications industry.

CS Communications Co Ltd

CS Communications Co Ltd (CSC) is a joint venture company between Shin Satellite Plc and the Communications Authority of Thailand (CAT), Thailand's state-owned international carrier and authority.

Established in 1994, CSC is licensed to provide uplink services and related businesses such as Satellite News Gathering (SNG), etc. The company is also a major Internet Service Provider (ISP) in Thailand.

Recent developments

Shin Satellite and CS Internet, Thailand's only nationwide Internet Service Provider (ISP), have jointly launched The country's first broadband Internet portal site, together with a complete range of e-commerce businesses. The new portal site, to be called Shinbroadband.com, takes a radical leap ahead with data rates that are 20 times those currently available using conventional 56kbit/s modems.

Shin Satellite explained that the broadband portal was conceived as a centre for producers of Internet content who deal in massive quantities of data. In addition, those who have a conventional Internet presence but want to take advantage of the portal's huge bandwidth are also likely to use the Shinbroadband.com portal.

In a separate new item, Shin Satellite has recently signed an agreement with UUNet, the Hong Kong MCI WorldCom affiliate, to open a new international gateway to serve increased Internet access demand in Indo-China and the Indian subcontinent, using Ku-band transponders.

Furthermore, the company has announced that the Indian Department of Space (DoS) has signed a contract for three further C-band transponders, increasing the total number of transponders leased by DoS to ten. They are to be used for the national TV operator, Doordashan, and for telecommunications. According to Shin Satellite, this latest order effectively fills the company's C-band capacity.

Finally, Shin Satellite has signed contracts with India's Trimline Investment Co and ATN International, and Abu Dhabi's Neibal Group International, for the lease of the C-band global beam of the Thaicom-3 satellite to broadcast globally in local languages to expatriates worldwide.

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The last obstacle

Restrictions on the use of Very Small Aperture Terminal (VSAT) networks need to be removed to make competitive use of this technology in developing countries. N.K. Chhibber, Secretary General of the Pacific Telecommunications Council (PTC) India Foundation, investigates the Indian case.

IT WAS IN 1965, with the launch of the Early Bird satellite, that a global commercial communication satellite was first used to connect people throughout the world. However, it was in the 1970s that satellites were used for the first time for communication within individual countries, with the US and Canada leading the way. But, at the time, satellite solutions were costly and ground terminals were out of reach of small companies.

Very Small Aperture Terminal (VSAT) technology emerged in the late 1970s as a satellite-based, low-cost approach for connecting multiple locations in private networks for data interchange. VSAT technology in the 1980s was used for corporate communication infrastructure. Finally, developing countries found the use of VSAT networks acceptable only in the 1990s.

During the last five years, satellite communication has emerged as the main technology for broadcast TV channels and high-quality digital audio programming services. Furthermore, Internet over satellite has also become popular. Currently, the request for satellite communications is such that one satellite is going up practically every month over the Asia-Pacific region.

The growth of VSAT services

Privatisation and deregulation were first introduced in developing countries around a decade ago. Before that, telecommunications services were supplied by government-controlled monopoly operators who had their own priorities. In fact, even after privatisation and deregulation, the growth of VSAT services remained slow, as rules and regulations remained in favour of monopoly operators. But during the last three to four years, regulations in many countries have been rationalised to a great extent, providing equal opportunities to all service providers. Currently, the economies of Asian countries are once again on the upswing. Therefore, there is great potential for the growth of VSAT services in these countries.

In India, VSAT networks for government organisations and the Department of Telecommunications (DoT) have been

in use since the late 1980s. But the use of VSATs by private organisations in closed user groups was only permitted in early 1992. Currently, VSAT services are extensively used to provide voice, data and fax services to various private corporate business houses and service organisations. Most of these organisations have their own closed user group VSAT services communication network.

At present, in India there are about 500 earth stations of various sizes and 10,000 VSATs in operation in the C- and extended C-band. The Ku-band has not been utilised in the country for VSAT communication purposes so far. Currently, there are about 30 VSAT networks in service in the country. Until January 2000, VSAT users in India were forced to use capacity on the Insat fleet of satellites, built and operated by the India Space Research Organisation (ISRO). However, following the country's new policy in the satellite communications sector, privately-run Internet Service Providers (ISPs) in

Photo: Government of India Tourist Office

the country have been allowed to use transponders on foreign satellites.

During the last five years, the following sectors have been increasingly using VSAT services in the Indian subcontinent:

- Financial sector - including stock exchanges;
- Banking sector for online transactions;
- Corporate communications for data/voice/video conference;
- Rural communications - basic service operators;
- Education and training through distance learning;
- Security communications by defence, police and intelligence agencies;
- Internet; and
- Long-distance service by the DoT.

However, India is not a limited case in the development of VSAT communications in the Asia-Pacific region. In fact, the growth of VSAT networks in China has been equally fast and there is a sizable market in other developing countries of South Asia like Pakistan, Bangladesh and Nepal.

VSAT and wireline/Wireless Local Loop (WLL)

Apart from the comparatively high cost, the slow spread of VSAT services in developing countries is mainly due to the restriction to use VSAT networks in closed user groups only, as its integration to public telephony networks is often not permitted. In India, private Basic Services Operators (BSOs) that have obtained licences to provide services in states (circles), have obligations to provide at least ten per cent of the telephones in villages. In order to achieve this target in time, these operators have obtained a licence to operate VSAT networks to integrate with wireline/Wireless Local Loop (WLL), in order to utilise satellite's inherent advantages of their ability to overcome geographic obstacles.

Large national telephone companies, like the Department of Telephones, also use VSATs to extend networks into remote regions. About three to five local access lines are terminated into a centrally-located VSAT terminal. This type of installation, referred to as 'thin-route telephony', is proving to be suitable and cost-effective for remote hilly regions.

The use of the Ku-band

The use of the Ku-band for VSAT services will spread in a big way, because of the many inherent advantages of the Ku-band over the C-band.

The main advantage in the use of the Ku-band is that the hub centres could be co-located with terrestrial transmission centres/telephone exchanges in the heart of cities, even on rooftops. Thus the need for end-links can be avoided, resulting in better reliability and savings on overall costs of transmission systems, including manpower required for operation and maintenance. Abundant Ku-band capacity is available on various satellite systems and frequency coordination will also be simple.

The Ku-band VSAT technology is extensively used over the world for voice and data communications, and many other applications. In fact, because of standardisation and bulk production, the costs of Ku-band technology have greatly reduced in recent years.

Photo: Government of India Tourist Office

Photo: Government of India Tourist Office

There has been reluctance to use Ku-band in tropical regions like India due to rain attenuation. However, this problem can be overcome by providing adequate fade margin to take care of attenuation during the monsoons period. There has to be a trade-off between the increase in cost of equipment and acceptable system availability. Normally, a 6dB margin will ensure an availability of 99.7 per cent.

VSAT network for disaster management

VSAT terminals have been effectively used in developing countries to provide reliable and efficient communication for disaster management. Droughts, floods and coastal cyclones strike South Asian countries almost every year. In addition, India, Pakistan and Nepal are also prone to earthquakes.

In October 1999, a cyclone of very high intensity hit the state of Orissa, India, with the loss of more than ten thousand human lives. In the same catastrophe, 50,000 cattle perished and damage to properties amounted to US$23 million. The communication network totally collapsed and it was only after 72 hours that communication through VSAT terminals could be established with the state capital. Subsequently, all district headquarters were connected through a VSAT network until the main terrestrial public network was restored. During April and May 2000, large parts of Rajasthan, Gujarat and Andhra Predesh faced severe drought conditions affecting over 50 million people. The lack of even basic telephony services in most parts of rural and remote areas have made the relief operations difficult.

Maharashtra communication network for disaster management

A multifaceted project for disaster management is being implemented in the state of Maharashtra, India. The World Bank and other international organisations are supporting the project. The implementation strategy is based on a series of activities, which provide support in the nature of infrastructure and organisational requirements. The activities include the setting up of:

- Emergency Operations Centre (EOC) in the State Secretariat at Mumbai;
- District control rooms in all 31 districts;
- A communication network for the entire state comprising wireless and VSAT technology; and
- A computerised Disaster Management Information System through Geographic Information System (GIS) applications and training.

The VSAT network has been set up for linking the state Secretariat to divisional and districts headquarters, while the space segment for the project is hired from INTELSAT. The system operates in the Ku-band frequency band - 14GHz for uplink and 11GHz for downlink. The full network can accommodate 60 voice channels at 8kbit/s - 30 simultaneous calls, six data carriers at 64kbit/s and two video carriers at 384kbit/s. The system operates in Demand Assigned Multiple Access (DAMA) mode with hub at Mumbai. A stand-by hub has been set up at Pune.

A wireless Very High Frequency (VHF) network has been provided to link the district to the sub-divisional bases and the Taluka headquarters. A separate VHF network has been implemented in Mumbai to meet the extreme needs of the city during disaster situations.

The total cost of the network has been $60 million, fully reimbursed by the World Bank. There are at least 15 other states in India that require similar networks. Bangladesh, Nepal and Pakistan perhaps need similar networks for disaster management.

Regulatory considerations

The concept of an independent regulator is comparatively new in developing countries, as privatisation and competition themselves are recent changes from government-controlled services. While Malaysia, the Philippines, Sri Lanka, Thailand and India have fairly liberal regulatory systems, other developing countries in the Asia-Pacific region still have conservative regulatory systems.

In India, the Telecom Regulatory Authority of India (TRAI) came into being in January 1997, with a view to provide an effective regulatory framework and adequate safeguards to ensure fair competition and protection to consumer interests. While, initially, TRAI followed the pattern of similar agencies in Canada and Australia, now it has to evolve and mature according to its own situations and experience. TRAI's main functions are to ensure:

- Technical compatibility and interrelationship of service providers;
- Regulation of revenue sharing;
- Compliance of licence conditions;
- Facilitation of competition and promotion of efficiency;
- Resolution of disputes between service providers and between service providers and consumers;
- Advise the government on development of telecommunications; and
- Compliance with universal service obligations.

The Government of India has recently reconstituted TRAI. The TRAI Amendment Ordinance 2000 has redefined the agency's role as a Appellate Tribunal. The newly-constituted body has the following role:

- To set policy framework and issues licences;
- To separate department as service providers;
- To set tariffs and advises on policy issues;
- To settle telecommunications disputes; and
- Its orders can be challenged only in the Supreme Court.

An empowered and independent regulator is a must for ensuring fair play in the marketplace. The main existing regulations on VSAT operation services in India, which restrict the growth of VSAT, are given below:

- Connectivity to Public Switched Telephone Network (PSTN) is not allowed;
- Operation in the Ku-band has only recently been allowed;
- Interconnection between the VSAT networks is not permitted;
- Annual licence fee is high; and
- Frequency coordination is a time-consuming process.

The market size

The economy in developing countries, particularly of India and China, is in upswing. An increasing number of multinational and national companies dealing in consumer goods and services are expanding their marketing and distribution networks in the region. This is true to the extent that it can now be argued that VSAT networks have become a status symbol of corporate communications in India. In basic telephony networks, terrestrial and satellite components are complementary. The terrestrial component provides coverage over areas with a population density considered large enough for the economic provision of terrestrial system. On the other hand, the satellite component provides services in remotely located areas with low population density. Currently, in India there are about 300,000 villages, out of a total of 600,000, without any telephony services. About 25 per cent of these could opt for VSAT communications. Every state in India wants to have its own VSAT network for disaster management and efficient administrative control and services. Some of the bigger states are planning to go for more than one network. The new satellite communications policy allows users to avail transponder capacity from both domestic and foreign satellites, in consultation with India's Department of Space (DoS). Furthermore, communications in the Ku-band are allowed.

For the banking, manufacturing and mining sectors, where most of the locations do not justify installation of terrestrial lines, VSATs are the only choice. Other areas of growth for VSAT are represented by Internet accesses for intranets, electronic commerce (e-commerce) and telemedicine. A number of companies are building countrywide VSAT networks, which will act as backbone for electronic fund transfer services. There are also plans to offer distance learning services, creating virtual classrooms that use satellite capacity.

Photo: Government of India Tourist Office

Conclusion

The growth of satellite communications in the Asia-Pacific region for the last two to three years has been around 36 per cent, which is one of the highest in the world. But VSAT markets in developing countries have experienced rather sluggish growth, with most vendors not faring as expected. One reason for VSAT business not picking up in developing countries is the regulatory bottleneck, like the prevention of connectivity to PSTN. High licence fees, satellite failures, and scarcity of satellite capacity due to the insistence that only indigenous satellites can be used, are other factors that have limited the growth.

There are geographical compulsions in developing countries, because general infrastructure is not developed. As a result, the penetration of VSAT networks in developed and developing regions will always be different.

Regulators and governments in developing countries are now more sensitive to the industry needs, and the use of VSATs is expected to pick up fast. Deregulation, rising demand, globalisation, technological advances and substantial price decline continue to drive the VSAT market in developing countries.

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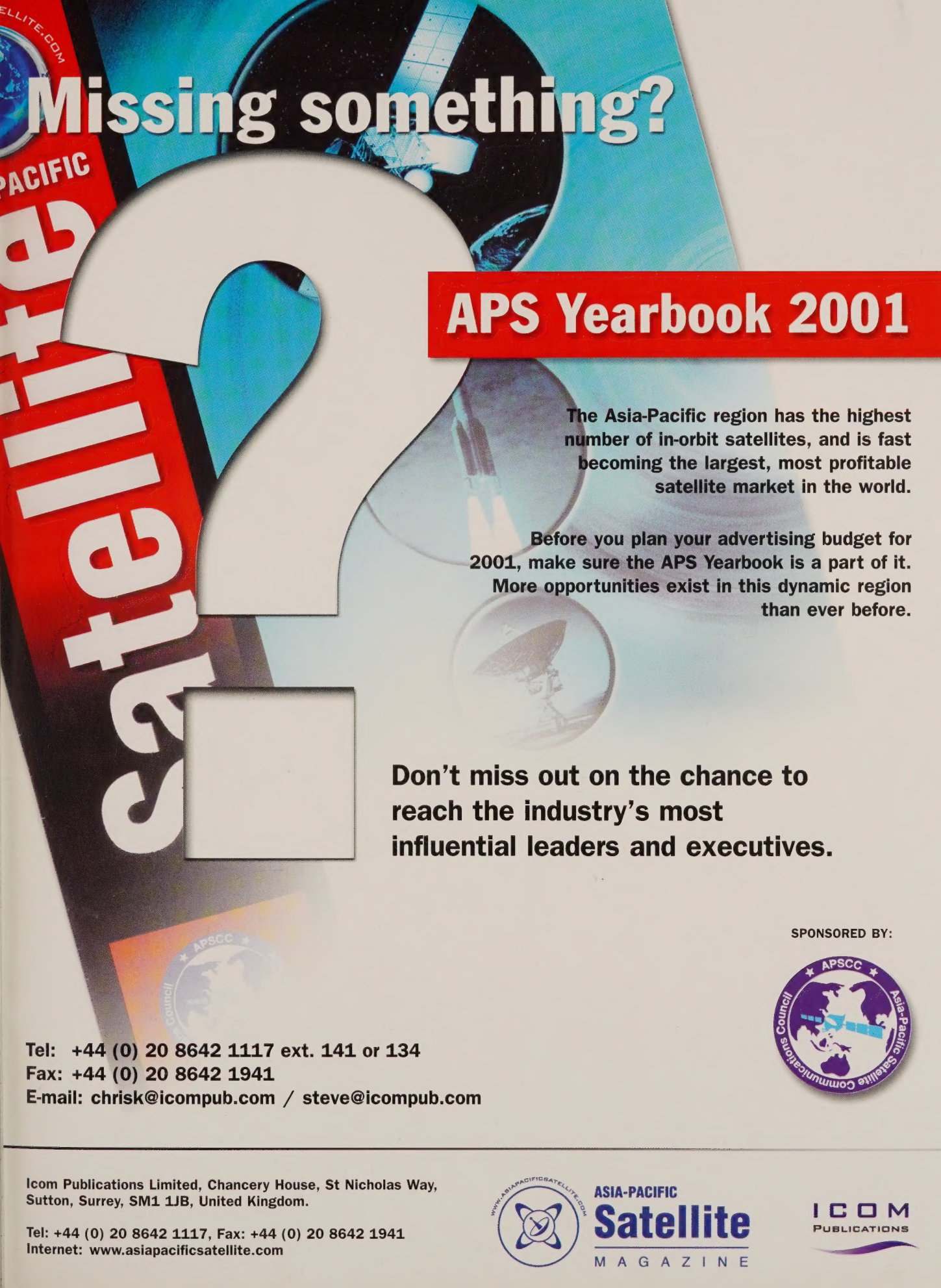
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